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Significance of the Leptospiroses in Military Medicine*

By

LIEUT. COLONEL LESLIE C. MURPHY, VC, *U. S. Army*†

AND

AARON D. ALEXANDER, M.S.†

RECENT reports of outbreaks of leptospiroses among British troops in Malaya[1-3] and among French troops in Indo-China[4] have again focused attention on these diseases as potential military hazards. The military significance of leptospirosis was first recognized in World War I when epidemic outbreaks of spirochetal jaundice or Weil's disease occurred in British, German, French and Belgian troops who were engaged in trench warfare along the Western front.[5-8] At the same time, this disease was also reported among Italian troops in Northern Italy and among Canadians in Salonika.[9] The leptospiral etiology of this disease was demonstrated by independently conducted investigations on the Western Front by research workers in the Army Medical Services of Germany, France, and Britain.[10-13] This confirmed the observation of Inada *et al.*,[14] in Japan in 1915 and provided additional clinical and laboratory information on Weil's disease. These European and Japanese investigators called attention to the then rarely recognized syndrome which was first described by Weil in 1886,[15] and they provided the stimulus for worldwide studies.

Following World War I, Weil's disease was recognized throughout the world and the high infectivity rates of Norway rats, the primary hosts, were reported in many countries.[9] The protean manifestations of Weil's disease were recognized and the classically described hepatonephritic syndrome was found to occur less frequently than had previously been recognized.[9,16,17] In addition, other diseases attributable to leptospires that differed serologically from the classical strain—*L. icterohaemorrhagiae*—were found in domestic animals as well as in humans, and the distribution of numerous serologically distinct strains, potentially infective for man among numerous rodent or other mammalian species, was also demonstrated. These investigations led to the concept that the leptospiroses were a group of diseases caused by distinct members of the spirochetal genus Leptospira.[16]

LEPTOSPIROSIS IN TROOPS AFTER WORLD WAR I

During the period between World Wars I and II sporadic cases and outbreaks of lep-

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† Department of Veterinary Bacteriology, Division of Veterinary Medicine, Walter Reed Army Institute of Research.

tospirosis were reported among military personnel in various parts of the world. In Great Britain, Weil's disease was found in four soldiers who had bathed in a local canal in a rat-infested area,[18] and a case was reported in a stableman who provided a history of association with a rodent and a dog.[19] Infectious jaundice presumably caused by leptospirosis was also noted among troops in India[20] and Indochina.[4] More important were reports in troops, for the first time, of outbreaks of leptospirosis more frequently anicteric, attributable to serotypes other than *L. icterohaemorrhagiae.* In Russia, cases of leptospirosis due to *L. grippotyphosa,* the etiologic agent of Swamp fever, occurred among soldiers who had bathed in a river located near their encampment.[21] At the same time, an epidemic of *L. grippotyphosa,* as well as *L. andaman* leptospirosis, broke out among inmates and military personnel of a prison camp in the Andaman Islands.[20] Seventy-three cases, with a case fatality rate of 18.7 per cent, were observed in this outbreak, which was associated with working in water-logged land.

At the outbreak of World War II a considerable mass of data dealing with the various epidemiological, clinical, and laboratory aspects of leptospirosis was available. However, most of this information did not gain universal recognition. The concept of leptospirosis, in this as well as other countries, was for the most part synonymous with Weil's disease, and only the relatively infrequent icteric aspects of this disease were recognized—a concept which unfortunately still prevails to a considerable extent. In addition, during the World War II, trench warfare was obsolete and presumably the absence of this type of warfare, which posed a serious problem of infection with spirochetal jaundice in World War I, served to divert attention from the infection hazard of leptospirosis in these military campaigns. However, severe epidemic outbreaks of leptospirosis were reported during this period. Bulmer[22] estimates that at least 100 cases of Weil's disease occurred at the Normandy beachhead among British soldiers who used local streams for washing and bathing. Subsequently, evidence of the occurrence of "mud fever" (*L. grippotyphosa* and *L. sejroe* infections) in addition to Weil's disease was uncovered in 1945 in British patients who were exposed to the wet soil of France.[23] In 1940 an epidemic of *L. grippotyphosa* leptospirosis broke out among German soldiers in the Valley of Charente.[24] The disease was anicteric and cases only occurred in soldiers who had bathed in the river. It is noted that the leptospiral etiology was not considered until local inquiry revealed that this region was an area of endemic leptospirosis. Explosive outbreaks of Weil's disease were also reported among troops in Bulgaria[25] and in Italy.[26] In both countries the outbreaks were associated again with a history of bathing in local waters.

It is difficult to assess the true incidence of leptospirosis in World War II. In retrospect it is now recognized that combat was conducted in many hyperendemic areas of leptospirosis and under conditions which would favor the spread of these diseases. Tabulations of the medical records of the U. S. Army for 1944-1945 indicate that 25 cases of Weil's disease and 3 deaths from this disease were reported among U. S. Army personnel in the Pacific areas. Five cases and no deaths from Weil's disease were reported for the China-Burma-India Theater for the same period. It is probable that these few cases represent only a fraction of the total number of actual cases in troops who were engaged in combat under primitive sanitary conditions in wet jungles. New Guinea, for example, is an area where 55 per cent of the indigenous population showed evidence of past or recent infection with leptospirosis.[27]

The absence of adequate diagnostic facilities and the general unawareness of the manifold clinical and epidemiological aspects of these diseases may have been significant contributory factors in our failure to detect leptospirosis in World War II. That epi-

demics of these diseases may occur without recognition of the etiology is strikingly illustrated by the outbreaks of a febrile, anicteric disease during the summers of 1942, 1943 and 1944 at the military reservation at Fort Bragg, North Carolina.[28,29] This disease, Fort Bragg fever, was considered of viral origin until Gochenour *et al.*,[30] demonstrated its leptospiral etiology nine years after the occurrence. Similarly, an outbreak of "aseptic" meningitis among American troops in Okinawa in 1949 was attributed to leptospirosis three years later.[31]

During the Korean conflict leptospiral diagnostic laboratory facilities were available and medical personnel were alerted to the potential infection hazard of these diseases. However, although these infections were enzootic in Korean wild life, leptospirosis in this conflict was not a military medical problem. In large measure, this was attributed to the nature of the terrain in which troop movement and fighting occurred, to the intensive rodent control exercised because of its importance in epidemic hemorrhagic fever, and to the high sanitary discipline of the troops, particularly with respect to water sanitation.[32]

In recent years, in addition to the Okinawa epidemic, outbreaks of *L. grippotyphosa* and *L. pomona* leptospirosis have been reported among troops in France[33] and Yugoslavia[34] respectively. Both epidemics were associated with bathing episodes. The potential infection hazard of leptospirosis in troops has been signally realized in the recent military operations in Malaya and Indochina. Since 1951 more than 100 cases of leptospiral infection caused by multiple serotypes were found annually in British troops engaged in jungle warfare against communist bandits in Malaya.[1,2,35] In a study in 1954-1955 of 614 military patients with acute febrile diseases, excluding those with demonstrable malaria parasites at time of admission and those whose only symptoms were gastrointestinal or respiratory, 35 per cent were diagnosed as leptospirosis.[2] This rate was higher than the combined rates for malaria, scrub typhus and dengue. Attack rates of 63 and 30 (cases per 1000 troops at risk per annum) were observed in the operational area of Pahang during 1954 and 1955, respectively. Similarly, in Indochina extensive epidemics of leptospirosis occurred in 1950 to 1952 among North African and European troops who traversed or operated in water and mud.[4] In a single operation, for example, 126 soldiers—25 per cent of the effective force —were infected with these spirochetal diseases.

The leptospiroses in troops as well as in civilians are accidental infections with organisms which are normally found in numerous species of rodent and other mammalian species as well as in domestic animals. However, military operations, in combat or peacetime maneuvers, are usually carried out under improvised sanitary facilities and under climatic and terrain conditions that they may introduce all of the factors conducive to the spread of leptospirosis in man. In order to properly appreciate the problem of leptospirosis in troops, it is necessary to briefly review the fundamental characteristics of leptospires and the more important epidemiologic facets of these diseases.

Characteristsics of Leptospires

Leptospires have a characteristic morphology that provides the basis of their generic classification. They are extremely thin—approximately 0.1 μ in diameter—and they are generally 4-12 μ long, although lengths up to 40 μ are frequently observed. Their ends are bent like the handle of an umbrella and throughout the length of the organism are minute spiral coils that have an amplitude of approximately 0.5 μ. In fluid media leptospires rotate rapidly on their longitudinal axis and this motility is peculiarly characteristic because of the spinning hooked ends. In semisolid media serpentine as well as boring and flexing movements are evident. They are extremely motile and are capable of penetrating filters, which retain most bacteria. Leptospires do not stain

readily with aniline dyes and cannot be observed with the ordinary light microscope. They can, however, be easily distinguished by dark-ground microscopy.

These organisms cannot be cultivated on the usual bacterial media. Specialized media containing buffered salts (pH 7.2 — 7.8) and approximately 10 per cent mammalian serum, preferably rabbit serum, are required to propagate leptospires. On solid media they do not colonize; however, in tubes of semi-solid media they form a characteristic linear disc of growth 1-3 cms. below the surface.

The pathogenic leptospires are indistinguishable on the basis of morphological, cultural, or biochemical characteristics; however, they possess distinct antigenic properties as observed in agglutination procedures which provide the basis for their differentiation. In the proposed taxonomic scheme of Wolff and Broom[36] leptospires with distinct antigenic characteristics are classified as serotypes, and those serotypes sharing major antigenic components are assembled into serogroups. In 1954, when this classification system was published, 34 serotypes were recognized. Since that time the number of known serotypes has virtually doubled.[37, 38]

Epidemiology

Leptospires are globally distributed in numerous rodent species and other wild life mammals. In addition, widespread leptospiral infections have been demonstrated in domesticated animals, particularly in canine, porcine, and ruminant populations. Studies conducted in many areas of the world have usually shown high infective ratios in normal hosts. Indeed, infectivity rates in excess of 50 per cent are not uncommon. In many instances serotypes may be associated with specific mammalian hosts; however, particular species may serve as the primary host to multiple leptospiral strains.[39]

In the past certain serotypes were found exclusively in particular geographic areas while others were widely distributed throughout the world. More recently, the global distribution of some of the "exotic" strains, hitherto isolated in circumscribed areas, has been recognized.[39, 40] There are, however, marked differences in the world-wide distribution of serotypes. Some regions, for instance, Southeast Asia, are areas of multiple leptospirosis wherein 12 to 36 different serotypes may be found, while relatively few serotypes are found in other parts of the world, such as Great Britain.[1, 37]

The leptospires are apparently well adapted to their natural rodent hosts, but they may set up asymptomatic to fulminating infections in the larger mammalian species. In the infected hosts, leptospires may nest in the renal tubules. They are then excreted with the urine, where they may appear in considerable numbers. The duration of leptospiruria varies with the host and the infecting serotype. Leptospiruria may persist for months in larger mammalian hosts, whereas rodent hosts may be chronic leptospiral shedders for years—possibly for the remainder of their natural life.[9, 16, 17]

Although man may be directly infected by contact with infected urine, more important in the epidemiology of epidemic outbreaks is the survival of leptospires in aquatic environments soiled by infective urine. That pathogenic leptospires remain viable up to six weeks in neutral or slightly alkaline damp soils or waters, has been demonstrated.[17, 41] These organisms cannot, however, survive in brackish or acidic aquatic environments—important factors that account for differences in endemicity in sectional areas of particular regions. From the aquatic environment, these pathogens can readily gain entrance into their new hosts by way of the mucosal surfaces of the eye, nose, and throat, or by penetrating scarified skin, or skin that has been softened by prolonged exposure to water. All humans, regardless of sex or age, are highly susceptible to leptospirosis.

Seasonal factors are obviously important in governing terrain conditions and in affecting the occupational or recreational activities of man. In this respect it is worthwhile to note again that many of the epidemic outbreaks of leptospirosis in troops have been

associated with bathing episodes.[21,22,24-26,31,33,34]

Problems of Leptospirosis in Military Medicine

Obviously, the extensive presence of leptospirosis in omnipresent natural hosts, the survival of these organisms in aquatic environments, and their ability to readily invade a highly susceptible human host, should direct our attention to the leptospiral infection hazard in troops who traverse or otherwise come into contact with streams, marshes, swamps, flooded or muddy areas that may be contaminated with animal urine. Certainly the recent experiences in Malaya and Indochina indicate that leptospirosis may be a major cause of disease in troops operating under the above conditions. In addition, the wartime devastation of developed areas and the disruption of modern sanitary facilities may preface the rodent infestation of a terrain ideally modified for the epidemic spread of these diseases in civilian as well as military populations.

From the military point of view, the reduction in the operational force by the hospitalization of patients, which frequently may be protracted, is, of course, a significant aspect of leptospirosis in troops. In addition, other aspects of leptospirosis pose problems in military medicine—problems of clinical and laboratory diagnosis, therapy, prophylaxis and control, as well as problems related to the health of canines closely associated with troops and the health of larger domestic animals which provide an important source of food.

Clinical Diagnosis. Fundamentally, the most important problem in military medicine with respect to human leptospirosis is that of recognition. Following an incubation period of usually 10 to 12 days, the onset of disease is abrupt and is generally characterized by high fever, severe frontal headache, myalgia, conjunctival injection, and malaise. However, the developing symptoms may vary considerably from severe icteric-hemorrhagic manifestations accompanied by renal insufficiency to benign catarrh-like presentations. In addition, rash, gastrointestinal disturbances, generalized myalgia and malaise, may be prominent features. Meningeal manifestations are frequently observed and are particularly predominant in infections provoked by certain serotypes such as *L. pomona* or *L. canicola*.[16] Uveitis is a frequent sequela.[42]

Because of this diverse symptomatology, it is necessary to differentiate the leptospiroses from infectious hepatitis, relapsing fever, malaria, typhoid fever, scrub typhus, undulant fever, dengue, sandfly fever, abacterial meningitis, poliomyelitis, and influenza.[1] In particular, the clinician should be alerted to the more frequently occurring, less familiar, nonicteric aspects of these diseases. It is significant that many outbreaks characterized by rash, meningitis, or other nonicteric symptoms are frequently recognized in retrospect as was the case in the Fort Bragg and Okinawa epidemics.[30,31] More recently, studies on the etiology of the so-called "abacterial" meningitides, conducted at the Walter Reed Army Institute of Research, as well as at other institutions, have shown that leptospirosis accounts for 3 to 10 per cent of these undiagnosed fevers.[43-45] Of paramount importance in the diagnosis of leptospirosis is the history elicited from the patient. Undiagnosed fevers associated with a history of direct contact with wild or domestic animals or contact with streams, ponds, damp trenches and foxholes, marshes, swamps, rice paddies, etc., should provide a high index or suspicion of leptospirosis.

Laboratory Diagnosis. Although leptospirosis may be suspected on the basis of clinical symptoms, the laboratory diagnosis is frequently elusive. Since leptospires are not readily demonstrated by the usual microscopic, staining and cultural technics, and in view of their ability to penetrate Seitz or other filters commonly employed in virus isolations, the diseases provoked by these organisms are undiagnosed or attributed to viral agents, as was the case in swineherd's disease or Fort Bragg fever.[46] However, lab-

oratory confirmation of the diagnosis of leptospirosis can be easily established bacteriologically or serologically if proper laboratory procedures are initiated during the course of disease.

The technics for the laboratory diagnosis of leptospirosis have been described in detail elsewhere.[47, 48] Generally during the first week of disease, which is characterized by leptospiremia, the organisms can be readily cultivated directly from the blood or spinal fluid if appropriate leptospiral media are employed. Leptospires may then be demonstrated in cultures after 1 to 4 weeks' incubation. With the disappearance of leptospires from the peripheral circulation they may be isolated from the urine by animal inoculation and cultural procedures. Also at this time specific antibodies provoked by the infecting serotype may be detected in the sera from patients. These detectable antibodies may persist for a year or longer.

The most common serologic procedure for the detection of leptospiral antibodies is the micro-agglutination test employing live or formalin-treated antigens. Because of the specificity of the agglutination reaction, antibodies elicited by a particular serotype may not be agglutinated by diverse antigenic serotypes. In order to insure detection of agglutinins which may be produced by approximately 60 different serotypes, we have found it necessary to employ a battery of 17 different antigens encompassing all known cross reactions.[49] Obviously this technic, because of its inherent laboriousness, does not lend itself to routine application in the ordinary laboratory. To circumvent the limitations of micro-agglutination procedures, antigens associated with a broader, generic principle have been extracted from leptospires by chemical or physical (such as sonic vibration) means.[47, 50–52]

The complement-fixation technic, employing sonic-vibrated antigens prepared from three strains, has proved to be a valuable diagnostic tool in the diagnosis of leptospirosis, irrespective of the infecting serotype, in investigations conducted in Malaya and Puerto Rico.[2, 47] However, the sensitivity and specificity of different lots of antigens are not reproducible and this technic should be examined more critically.[53] More recently "erythrocyte sensitizing substances" which are extracted chemically or by heat from leptospires and which show genus-specific cross reactivity have been developed for use in hemagglutination and hemolytic procedures.[51, 54] The results of evaluation tests with the "erythrocyte sensitizing substances" are promising and there is reason to believe that a simple, sensitive, and specific serologic procedure will be perfected.[55, 56] Still urgently needed is laboratory confirmation or denial of etiology during the acute phase of disease when cultural and serological demonstrations may still be inapparent.

Therapy. At the present time, no single chemotherapeutic agent has been demonstrated to be effective in all human cases of leptospirosis. Antibiotics have been evaluated in several extensive studies; however, the results are variable.[35, 57, 58] There is good evidence that antibiotics, particularly penicillin, streptomycin, aureomycin and terramycin are effective during the first few days of illness before pronounced symptoms are evident.[59, 60] After the fourth day of illness, antibiotics are apparently ineffective in altering the course of disease.[57, 59] Similarly, serum therapy is effective only if given early and if the serum contains specific antibodies related to the inciting strain.[9, 17] Further search for a specific chemotherapeutic agent and evaluation of the newer antibiotics in the treatment of human leptospirosis are still needed.

Prophylaxis. Either antibiotics or vaccines may be employed as expedients in the prophylaxis of human leptospirosis. Although antibiotics have not been demonstrated to be effective in human therapy, the therapeutic trials in human cases as well as in experimental infected animals provided evidence that these substances were effective prophylactic agents.[60] Additional evidence of the efficacy of antibiotics in prophylaxis of leptospirosis was obtained in a recent study

among rice field workers in Spain.[61]

The effective control of human leptospirosis by vaccine prophylaxis was demonstrated early in the history of leptospirosis by Wani.[62] However, immunization against leptospirosis has not received broader application because of the severe reactions produced by vaccines.[63,64] Within the past few years vaccine prophylaxis of livestock has been extensively applied in this country. There is evidence that these measures may prevent acute leptospirosis[65] but additional information on the prevention of leptospiruria in vaccinated animals is wanting. In human leptospirosis the prophylactic efficacy of vaccination with formalin-treated suspensions of leptospires was dramatically demonstrated in extensive field trials conducted among rice field workers in Italy and Spain.[61,66,67] The vaccines were polyvalent, prepared from two serotypes and elicited no untoward response.

From the military viewpoint, the incidence of leptospirosis in troops has not been sufficiently high to warrant the routine immunization of troops. It has not been feasible at this time to prepare a polyvalent vaccine which would afford protection against the numerous serotype strains. The selection of serotypes for the preparation of vaccines would vary in different parts of the world. In some areas of multiple leptospirosis such as Malaya, it may be possible to prepare a polyvalent vaccine which would protect against infections by the more frequently occurring serotypes; however, further studies on the efficacy of polyvalent vaccines in cross-protection against a multiplicity of serotypes is desirable. Meanwhile as a practical expedient, antibiotics may serve as a transient effective measure to prevent leptospirosis in troops exposed to recognized grave sources of infection.

Control. Perhaps the most important aspect of control of leptospirosis is the education of troops to infection hazards and to sources and modes of infection. The current methods in military sanitation embody many principles, the application of which can arrest the spread of leptospiral diseases. The significance of strict observance of sanitary discipline, particularly with respect to the chlorination of water used for drinking, bathing, and washing; rodent control, protection of food and water from contamination, prohibition of swimming or bathing in ponds, streams, or other waters, should be emphasized. Other control measures that may be effective are: the wearing of protective clothing and the employment of disinfectants, such as calicum cyanamide, to known foci of infection.

Leptospirosis in Domestic Animals. Leptospirosis is now recognized as one of the most important diseases of domestic animals. High prevalence rates of canine leptospirosis have been observed in all sections of the world.[68] In the United States, notwithstanding the high sanitary standards employed in animal husbandry practices, leptospirosis occurs extensively in cattle and swine, and outbreaks have also been reported in horses.[69,70] A similar disease situation prevails in comparable countries, and it is reasonable to assume that the problem of leptospirosis in domestic animals is more acute in undeveloped countries. Obviously, the health of domestic animals has an important bearing on military medicine. Dogs are intimately associated with troops either as service animals or mascots. Leptospirosis in the larger domestic animals is significant since they may serve as potential sources of infection. In addition, these diseases are important in so far as they affect the health and productivity of animals, which are important to food supply, particularly in times of war.

Summary

The high attack rates of leptospirosis in the British troops in Malaya and the French troops in Indochina have again focused attention on these diseases as potential military hazards. In the military history of leptospirosis since World War I, the sporadic epidemic outbreaks caused by *Leptospira icterohemorrhagiae* and other leptospiral serotypes during the periods of peace and

war, are reviewed. It is notable that the leptospiral etiology was not recognized in several epidemic outbreaks at the time of occurrence. Leptospires were probably important etiologic agents in undiagnosed febrile diseases that occurred during World War II in troops operating in hyperendemic areas of leptospirosis. The failure to recognize leptospirosis in troops was due in part to the general unawareness of the more frequently occurring, nonicteric, protean manifestations of these diseases. Other factors that contribute to missed diagnosis of leptospirosis are related to the peculiar bacteriological and serologic properties of leptospires that preclude their detection by routine laboratory diagnostic procedures. The important epidemiological factors that operate in the transmission of these diseases have an important bearing on the potential infection hazards of troops operating under improvised sanitary conditions in peacetime or wartime maneuvers. Leptospiral diseases pose problems in military medicine related to clinical and laboratory diagnosis, treatment, prophylaxis and control. In addition, the occurrence of leptospirosis in domestic animals is important in military medicine since these animals may serve as potential sources of infection. These diseases may affect the health and productivity of animals which are important to the food supply, particularly in times of war.

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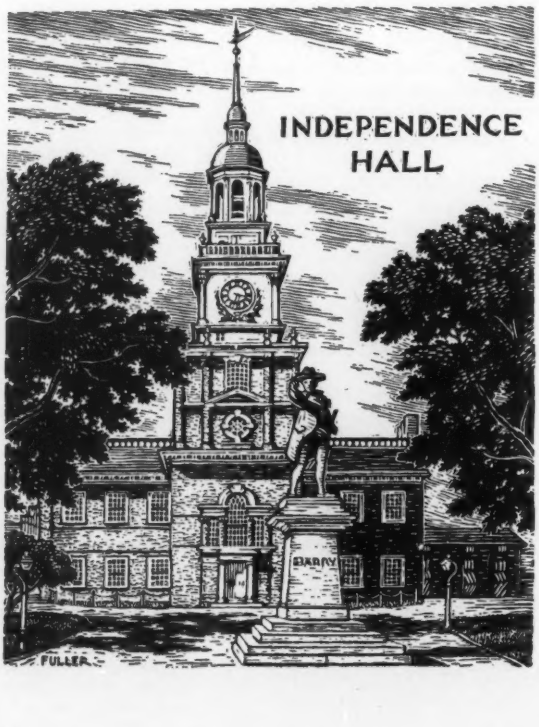

Military Veterinary Research in Radiation Biology*

By
MAJOR MAX M. NOLD, USAF (VC)†

INTRODUCTION

THERE have been more rapid technological developments in the past fifteen years than during any other time in the history of man. Since the splitting of the atom the advances have proceeded at an almost terrifying pace.

Already industry is developing atomic power to supplement the more common power sources. The actual use for this purpose will be a reality within a matter of months. In the field of quality control, industry is using radioactivity as a method of gauging thicknesses with a speed and accuracy almost undreamed of a few years ago. The tracing of radioactivity in "wear tests" is a tool which industry had long sought.

In the field of agriculture, radioactivity provides a means of obtaining answers which were difficult or impossible to attain previously. For instance, it has been found that a corn seedling will only use that phosphorus within a couple of inches of the kernel and the fertilizer spread on the rest of the ground "goes to waste." The well-known case of the elimination of the screw worm fly in Curacao is an instance which is directly traced to the effects of radiation. By radiation sterilization of the male and the peculiar habit of one-time mating of the female, the screw worm fly problem on this tiny island is a thing of the past. We have all read about the radiation sterilization of foods and drugs. A radiation sterilized drug product is already on the market. In the case of foods, there are some unwanted side effects which occur that must first be overcome. However, we should certainly see applications in this field in the near future.

With the possible exception of uses for power, the utilization of radiation has probably been most widely heralded in the field of medicine. The therapeutic uses will probably be primarily limited to certain disease conditions such as polycythemia vera and certain of the leukemias. In the diagnostic field, the applications are wide and varied. The uptake of I^{131} for thyroid function is a commonly used procedure at present as is the use of radio-iodine serum albumen in blood volume determinations. Certain tumor masses seem to have an affinity for phosphorus which greatly facilitate location during surgery.

In the military, the first thought that comes to one's mind is the use in nuclear warfare. But the use of the atom's energy in package power units also holds great promise. The experience with the *Nautilus* is good testimony of such a use. Likewise, the uses listed for the medical field are completely applicable for military medicine.

HEALTH HAZARDS

The applications stated above are examples of use of radioactivity in the various fields. There are many other examples—all of which add up to a very large credit side on the use of radioactivity. However, along with the peaceful uses there is always the ultimate question, "What will be the effect on humans—either directly or indirectly?" It is well established that there are undesirable effects on man. These effects may be exhibited soon after exposure or may not show up until much later—as much as several generations.

In the past the prime emphasis has been on the radiation effects which are exhibited soon after high dosage. This includes such phases as the intestinal and hematologic syndromes—those disease condition states which show up within 30-60 days post exposure. It is known that radiation exposure is a

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† Oak Ridge Institute of Nuclear Studies, Oak Ridge, Tennessee.

definite predisposing factor for later increased percentages in leukemia cases and tumor inductions. The increased number of cases of leukemia in radiologists are mute testimony to this fact. Likewise there are indications that the ageing processes are accelerated due to radiation exposure and there is a shortening of the life span. The aspect that is presently receiving great emphasis is the interference with the inheritance mechanism. Practically all radiation-induced mutations which have effects large enough to be detected are harmful. It may be several generations before a radiation-induced mutation would be noticed. Unlike the radiation effects which manifest themselves soon after dosage in which dose-rate may be as important as dose, in the genetic effect the only important factor is the total dose—regardless of the dose-rate or any intermittent lapse from radiation exposure. These conditions make it vital that as much be learned as soon as possible in order to determine permissible background levels and radiation exposure to the individual in the reproductive phase of life.

Research Requirements

It is not ethically possible to perform the research required on the individual with whom we are concerned—man. It is therefore necessary to carry out these programs with animals and make extrapolations to man—correlating the results with what data there are on the human. The extrapolations from animal data are precarious at best. Normal animals in the best of health and under proper sanitation and care are a necessity. The nature of a veterinarian's schooling equips him to fill a very important slot in the research team. He contributes materially to the overall effort of the group. By application of his knowledge and skills the final results became a better measure of the true values.

Service Veterinarians in Radiobiological Research

Veterinarians of the Army and Air Force were active in developing a project on whole body irradiation of large animals at the University of Tennessee-Atomic Energy Commission Agricultural Research Project. They have been assigned to this organization on an overlapping rotating basis for the past six years, and have contributed greatly to the growing store of knowledge in the area of external whole body ionizing radiation effects. The comparison of the various energy gamma rays from Co^{60}, Ta^{182}, $Zr^{95}-Ni^{95}$ and their respective LD 50/30 effect is the only such work that has been done on large animals. The burro has been used principally in this work because the body size more nearly approximates that of man than does that of some of the other species. The object of this work was to help determine the permissible levels of radiation to which military personnel may be subjected. In an experiment in which burros were exposed to 50 roentgens a day from Co^{60}, the longest lived individual survived 35 days. Using the pig under the same experimental conditions, the longest lived individual survived more than a year. Resultant data of this type point out the individual species variations and further complicates the extrapolations that are necessary in order to apply the results to man. Special emphasis is being placed on the latent effects that will manifest themselves in survivors from previous radiation studies. Blood samples from these animals are routinely examined at frequent intervals in order to detect such dyscrasias as an early thrombocytopenia or leukemic condition. Also routine ophthalmic examinations are made on these survivors in order to evaluate any latent radiation damage the eye might exhibit. These military veterinarians have been the prime contributors to helping solve the epidemiology picture of the radiation syndrome in the large domestic animal. On numerous occasions members from this group have been called upon by the Atomic Energy Commission to be the official governmental representatives in the investigation of animal losses attributed to fall-out from weapon's tests. The completeness of the hematological

and pathological investigations which have accompanied their research work in Oak Ridge has been of inestimable value in evaluating the true picture in these situations.

The Oak Ridge Institute of Nuclear Studies (ORINS), Oak Ridge, Tennessee, is known throughout the world. It is the home of the Basic Radioisotopes Course—a prerequisite for those who use and handle radioisotopes. The Air Force has had a veterinarian assigned to this Institute since the spring of 1955. One activity of this organization in which the military veterinarians assigned in the Oak Ridge area participate is the presentation of a two week indoctrination course in Veterinary Radiological Health. This course is specifically designed to instruct Armed Forces Veterinary Officers in the evaluation of problems of radiation phenomena, particularly in relation to their biological effects and the possible or potential factors involved in the radiocontamination of food producing animals or food products. More than 250 veterinary officers of the Army and Air Force have attended this course. It is felt that should a radiological emergency arise, these officers would form an organized nucleus of veterinarians indoctrinated in veterinary radiological health.

The ORINS assignee also assists in a radiobiological research program as time permits. Much emphasis has been placed on the investigation of calcium and strontium metabolism. Sr^{90} is considered to be the most important health hazard isotope—and since it is a fission product it is present in fall-out. Its importance is due to its half-life of about 20 years and the fact that it is a bone seeker. The effects of some organic compounds on the absorption of calcium and strontium from the gastrointestinal tract have been studied as has some of the other relationships of calcium and strontium metabolism.

Recently a technique has been developed which permits the placing of a cation exchange resin into various segments of the gastrointestinal tract. Since this resin will hold the radioactive atoms of calcium and strontium with which it comes in contact, a very convenient way of determining the relative amount of excretion in the gut lumen is accomplished. With manipulations of this type, it is possible to obtain biological data not obtainable by previous methods. Information of this type is extremely valuable in calculating the maximum permissible concentrations of certain of the radioactive isotopes.

Another example of the work done by the veterinarian at ORINS serves to point out the type of studies undertaken. It is generally recognized that one of the most immediate effects of radiation is the gastrointestinal syndrome. This gut effect manifests itself from external ionizing sources of radiation as well as from ingested activities in which case the radiations emanate from within the gut lumen. National Bureau of Standards Handbook 52, "Maximum Permissible Amounts of Radioisotopes in the Human Body and Maximum Permissible Concentrations in Air and Water" describes the maximum permissible concentrations as set up for a standard man. To a large extent these values are calculated estimations. It seemed highly desirable to check these values against biological experiments and their values. A brief description of the techniques and methods used in obtaining this information follows:

The dog was the experimental animal of choice. Yttrium was chosen as the isotope to be used because it passes through the intestinal tract almost entirely unabsorbed. Y^{90} was the particular isotope used since it is a pure beta emitter. It has sufficient energy to penetrate the mucosal layer and affect the dosimeter. Since there is no associated gamma ray in yttrium's decay scheme, the intestinal wall does not receive radiations other than those betas associated with the activity present in the immediate luminal area. The dose measurement is less confused because of this single decay scheme.

The dosimeters are made of silver phosphate glass and are quite small (1 mm in dia. by 6 mm in length). This type measur-

ing device was developed by Schulman of the Naval Research Laboratory. The glass fluoresces under ultraviolet light. Exposure to radiation causes a rearrangement within the glass structure resulting in increased fluorescence. This effect is calibrated against the amount of radiation necessary to produce the same effect.

The dog is anesthetized and the dosimeters implanted on the submucosal layer of the various segments of the gastrointestinal tract. The animal is allowed to fully recover from the operation before a known amount (25mc) of Y^{90} is administered in the feed. Sufficient time is allowed for the activity to traverse the gastrointestinal tract and be evacuated. This necessitates a time lapse of one week to ten days between dosing with the activity and recovery of the dosimeters.

The dosimeters are then harvested after the depth of implantation from the surface of the mucosa has been measured. The degree of fluorescence and the distance beneath the mucosal surface permit calculation of the dosage received by the surface of the mucosa.

The results are then evaluated and compared to those values for a standard man. Certain assumptions must be used in these extrapolations. It is noted that the results compare quite favorably with the values stated in Handbook 52. For this particular isotope of yttrium the biological results are in good agreement with the calculated amounts.

The Air Force also has two veterinary officers assigned to the AEC installation at Hanford, Washington. Their work is primarily concerned with the internal effects of another fission product, radioiodine. Considerable work has also been done at this location on the phenomenon of beta burns.

The Army has a veterinarian assigned with the Medical Nutrition Laboratory at Fitzsimons General Hospital, Denver, Colorado. This organization is concerned with the nutritional aspects of radiation sterilized foods. In addition to short-term and long-term rat feeding studies, this group is also feeding diets to human volunteers in which 35% to 100% of the calories are supplied by irradiated food items.

Other Army and Air Force veterinarians are assigned to Hunter's Point, School of Aviation Medicine, Food and Container Institute, Walter Reed Army Medical Center, and as aids or consultants to the Atomic Energy Commission. In each of these cases, part or all of the officer's duties consist of assisting in the current radiological program.

Summary

It can be stated that many atomic energy applications are in present use and that with them come related problems and challenges. It is imperative that these be answered as soon as possible. Research with animal populations serves as the avenue of arriving at the solutions. The veterinarian plays an important role in this field of radiobiological research. Service veterinarians have contributed greatly in this field of endeavor. Army and Air Force veterinarians are presently assigned to various governmental installations engaged in this type of work. Much needs to be done in the broad area of latent effects—especially in the field of genetics, aging processes or life shortening, and those disease conditions which arise long after radiation insult.

Spontaneous Reductions of Dislocation of Cervical Intervertebral Discs*

By
BENJAMIN H. KESERT, M.D.†

WE ARE all aware of the fact that cervical spinal cord injuries can occur in patients showing no radiographic evidence of injury to the spinal column.

Various explanations have been given for this picture. Most of the explanations have been speculative, repeated and quoted by one author and passed on as the gospel truth by another author without scientific proof.

There is the old explanation of "recoil injury" in which the spinal cord is severely damaged without demonstrable injury to the vertebra. Diving and certain automobile accidents in which the head is whiplashed forward producing a sudden, anterior flexion of the cervical spine are the common causes. Recoil injury is theorized to be due to the sudden dislocation of a vertebral body, followed by recoil and reflex contraction of the antagonist muscles.

This explanation is most improbable and inconceivable. We know that each vertebra is held in place by ligaments. Free mobility of the vertebral bodies depends on the tearing of these ligaments. Davis has shown by experiment that the anterior longitudinal ligament shows no evidence of stretch and that the average breaking point is at 337 pounds. The ligaments of the vertebral column are relatively stronger than the bones, and the latter are more apt to fracture under stress than the ligaments are apt to rupture. We do not deny the fact that the anterior longitudinal ligament can rupture. We have come across patients with cervical spinal cord injuries in whom radiographs taken immediately after injury showed a fracture or fracture dislocation. Films taken several months later in these same cases showed calcified shadows in the anterior margin of one of the cervical interspaces. These were interpreted as calcification in a hematoma associated with the rupture of the anterior longitudinal ligament, but we have never seen such a calcification in cases showing no radiographic evidence of fracture or fracture dislocation.

Cramer and McGowan in 1943 had a new concept to explain cervical spinal cord injury in cases showing no radiographic evidence of bone injury. On the basis of their observations and findings it was their contention that here was a sudden protrusion of the intervertebral disc by means of the "hydraulic ram-like" action of the nucleus pulposis when subjected to a sudden compressive force, thereby causing injury to the spinal cord. In their case report the spinal cord was almost severed by a prolapsed or dislocated intervertebral disc at the 5th cervical interspace.

Unlike flexion injuries where the spinal cord injury can be explained by a retropulsion of an intervertebral disc, hyperextension injuries may cause damage by the forward bulging of the ligamentum flavum. Proof of such a mechanism of injury to the spinal cord was shown by Taylor of Edinburgh, Scotland, in his experimental studies on cadavers with radio opaque oil injected into the cervical spinal cord. The smooth outline of the fluid column was undisturbed in flexion and in the neutral position. On forced hyperextension a series of indentations appeared on the posterior surface of the column opposite the interlaminar spaces. These appeared to be caused by an inward bulging of the compressed ligamentum flavum. It is, therefore, very important in *all cases of cervical spinal cord injuries to ascertain the exact manner of injury and whether the injury was caused in flexion or*

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† Consultant, Neurology, Veterans Administration Hospital, Hines, Illinois. Associate, Department of Neurology and Psychiatry, Northwestern University Medical School, Chicago, Illinois.

in hyperextension. This information will give a clue to the exact mechanism of injury to the cervical spinal cord.

At the Veterans Administration Hospital, Hines, Illinois, where we have about 100 patients with cervical spinal cord injuries, only three cases showed no radiographical evidence of injury to the cervical spine, either fracture, dislocation, or fracture dislocation. All three patients showed neurological evidence of severe spinal cord injury. The manner of injury in these cases indicated acute flexion of the cervical spine at the time of the injury.

Case 1

W. E.: White, Male, Age 29. While playing ball ran into another player, falling backward, and striking the back of the head. He immediately became quadriplegic. Neurological examination showed a spastic quadriplegia with a loss of sensation to pain, temperature, and touch below the upper level of the chest. Spinal fluid and manometric studies were normal. X-ray of the cervical spine was normal showing no evidence of fracture or dislocation. The neurological picture was that of an anterior spinal artery syndrome. It is our contention that the cervical spinal cord was injured anteriorly. The only movable substance within the spinal column was the intervertebral disc that could have been propelled posteriorly with sudden flexion of the cervical spine hitting the anterior portion of the spinal cord and damaging it.

Case 2

C. T.: White, Male, age 35. He was in an automobile accident when he hit a tree to avoid hitting another car. He was rendered unconscious for 48 hours. Neurological examination showed a spastic quadriplegia with loss of sensation to pain, temperature, and touch at the level of upper part of the chest and upper extremities. Several spinal punctures revealed no block and the fluid clear. X-rays of the skull and cervical spine were negative except for a reversal of the normal cervical curve of the spine.

Here we again have a picture similar to that in the first case. However, here we do not know the exact manner of the injury, whether it was in flexion or hyperextension, because the patient was rendered unconscious at the moment of injury. We assume that the cervical spinal cord injury occurred in the position of acute flexion and that there was a sudden protrusion of the intervertebral disc when subjected to sudden, intensive compressive force, damaging the spinal cord anteriorly and producing the syndrome of the anterior spinal artery.

Case 3

R. S.: Age 39. Injured in a diving accident. He was rendered quadriplegic immediately. Sensation to touch, pain, and temperature lost below T-2. Manometric and spinal fluid studies were normal. X-ray of cervical spine showed no fracture or dislocation. Diagnosis of myelopathy, transverse, traumatic, physiologically incomplete, at 7th cervical segment of the cord was made. Most of the damage was to the anterior portion of the spinal cord, the posterior portion being spared. Again showing a cervical spinal cord injury without X-ray evidence of bone injury in sudden flexion most likely causing a ram-like hydraulic action of the intervertebral disc and its immediate release and return to its former position.

Conclusion

Three cases of cervical spinal cord injuries showing the syndrome of the anterior spinal artery where no bony injury is seen radiographically. It is the contention that the injury to the cervical spinal cord is the result of the sudden piston-like action of the intervertebral disc when flexion occurs at the time of injury.

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Apparent Specific Inhibitive Action of Certain Oxytoxic and Spasmogenic Drugs and Substances Against Cercariae of *S. Mansoni*

A Preliminary Report of In Vitro Tests

By

EMORY C. CUSHING*

MUCH experimental work has been done to develop an ointment for application to the skin, and fabrics to protect individuals, in schistosomatous waters, against the penetration of schistosome cercariae.

Many chemical-containing ointments have been formulated which are promising protectants against the penetration of schistosome cercariae, but the results of various researchers in this field apparently have not indicated any group of related chemicals that is specifically suitable for incorporation in protective ointments.

The author is of the opinion that the more promising ointments owe their protective effect to the toxicity of the incorporated chemical in high dilution to cercariae; a sufficient amount diffusing into the surrounding cercariae-infested water to kill the organisms before they can penetrate the skin of the test animal. Hunter and Kemp,[1] in their experiments, recognized the possibility of this factor's influencing the results of tests with protective ointments. In the tests reported in this paper, it is indicated, however, that certain chemicals and drugs show exceptional activity against *S. mansoni* cercariae in high dilution.

Regardless of the mode of action of protective ointments and fabrics against cercariae, the writer believes that these methods, except under certain conditions, do not afford infallible prophylactic measures against contracting schistosomiasis.

For those individuals who are more or less continually exposed to infection by having to work in cercariae-infested waters, the use of ointments might prove ineffective due to its being rubbed off by constant contact with clothing, leaving unprotected skin areas through which cercariae could penetrate. Clothing made from fabrics impregnated with protective substances or of a sufficiently close weave to prevent the invasion of cercariae probably would be too hot and uncomfortable to be tolerated by the wearer.

For troops operating in schistosomatous areas, the continuous wearing of protective clothing seems likely to be objectionable, and troops in action in those areas frequently would not have or take time to apply thoroughly a protective ointment. Furthermore, isolated units may not have a supply of the ointment when needed; and accidental exposures of individuals would inevitably occur among large numbers of combat personnel.

It occurs to the writer that research is needed to develop a prophylactic drug which would kill the cercariae in the bloodstream and prevent their maturing to pathogenic stages. A drug of this type could be administered within 24 hours after exposure and prevent the development of schistosomiasis.

The experiments reported herein indicate that certain drugs, the pharmacology of which has been determined already, are inimical to *S. mansoni* cercariae in low con-

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The experiments reported in this paper were undertaken on the initiative and at the personal expense of the author; statements and conclusions are his own are not to be interpreted as reflecting the views of personnel of the Army Medical Service.

* Colonel, Honorary Reserve (Medical Service Corps), AUS, Retired. Address: Rt. 1, Box 38, Stockdale, Tex.

centration and would appear to be safe and effective for the prevention of schistosomiasis by oral administration. These drugs and substances are classified as oxytocics which comprise two groups as ordinarily used in medicine: one group is the ergot alkaloids, the other is derivatives of the posterior pituitary gland.[2]

The most effective of the natural ergot amine alkaloids which apparently produce the least undesirable systemic reactions, is *ergonovine*. It is readily and completely absorbed upon oral administration, produces rapid effects, causes only slight adrenergic blockage, has but little vasoconstriction activity, and exhibits only one-fourth the toxicity of other natural alkaloids of ergot. As indicated in Table I, ergonovine, 0.2 mgms., in maleate injection form in 1 cc. solution diluted to 10^{-7}, immobilized the cercariae of *S. mansoni* in five minutes.

Materials and Methods

Cercariae. The cercariae of *S. mansoni* used in the tests shown in Table I were freshly emerged from infested *Australorbis glabratus* snails kept in small vessels of chlorine-free water. The water in these vessels was then pooled in a single container and 1 milliliter with cercariae was removed and placed in each of three clean, embryological watch glasses and examined under a dissecting microscope to be certain that each watch glass contained active cercariae, after which time one milliliter of a given dilution of the solution of the test drug or substance was added to each watch glass. Three dilutions of the solution of the test drugs or substances were used: 1:100,000, 1:1,000,000 and 1:10,000,000. Since one milliliter of water was picked up when placing the cercariae in each watch glass, the organisms were actually exposed to double the dilutions of the test drugs and substances.

At the end of 5, 15, and 30 minutes each watch glass was examined for motile cercariae. The effect of the test material was indicated by the absence of any mobility of the cercariae at the end of the three time intervals. If no active cercariae were observed the effect of the test material was recorded as "motility stopped."

Discussion of Results

The first indication that oxytocic drugs might have an adverse effect on cercariae was obtained after testing the effect of a ten percent solution of the infusion of the ground root of *Cucurbita foetidissima*, a specie of indigenous wild gourd of Texas and the southwestern United States. It is reported that infusions of parts of this plant were used by the Spaniards and early western pioneers for the relief of rheumatic and arthritic pains. In Ferguson's[3] study of the pharmacology of *C. foetidissima*, a crystalline and an amorphous product was removed from an alcoholic extract of the plant and the remainder of the extract assayed (0.25-0.75 milliliters of the extract caused convulsions and death in mice). The assay against rat uterine strips was found to increase the tone of the smooth muscle, a definite oxytocic effect. It has a spasmogenic or stimulating effect on the isolated intestine of the rat or mouse. In perfusion experiments, the coronary vessels of the rat's heart are contracted.

Willaman[4] states that there are just sufficient amounts of saponin and sterol in the roots of *C. foetidissima* to give a detectable trace of these substances when tested for them.

Thus, in attempting to relate the effect of extracts of *C. foetidissima* on cercariae of *S. mansoni* with the pharmacological and chemical constituents of the plant, it seems reasonable to assume that both its oxytocic and apparent aglyconic properties may have been responsible for its immobilizing effect. Since ergonovine appears to have the strongest oxytocic action of the derivatives of ergot alkaloids, and in view of this drug's exhibiting an equal or similar activity against cercariae, it seems probable that the action of the extract of *C. foetidissima* root against cercariae may have been due entirely to its

TABLE I

THE EFFECT OF CERTAIN DRUGS AND OTHER SUBSTANCES ON THE MOTILITY OF *S. mansoni* CERCARIAE EXPOSED IN HIGH DILUTIONS FOR DIFFERENT TIME INTERVALS *in vitro*

Drug or Substance Tested	Effect at 1:200,000 Dilution			Effect at 1:2,000,000 Dilution			Effect at 1:20,000,000 Dilution			Cont'l.
	5 min. exp.	15 min. exp.	30 min. exp.	5 min. exp.	15 min. exp.	30 min. exp.	5 min. exp.	15 min. exp.	30 min. exp.	1 hr. exp.
Ergonovine in maleate injection form, 0.2 mgm. in 1 ml. diluted 10^{-7}	*	*	*	*	*	*	*	*	*	†
0.1% Berberine, acid sulfate solution, 1 ml. diluted 10^{-7}		*	*			*			*	†
10% sol. 22-day old infusion of Yucca leaves, 1 ml. diluted 10^{-7}	*				*		*		*	†
Pitocin 1 ml. of 0.5% solution diluted 10^{-7}		*	*			*	*			†
Pitressin 1 ml. 0.5% solution diluted 10^{-7}			*		*	*	*	*	*	†
10% sol. soxhlet extract of *C. foetidissima* root, 1 ml. diluted 10^{-7}	*				*		*		*	†
Chloroquin diphosphate 2–0.5 gm. tablets 0.6 gm. base dissolved in 10 mls. sterile distilled water, 1 ml. diluted 10^{-7}										†

* Motility of cercariae stopped in the dilution after the time of exposure indicated.

† Cercariae alive and active in one ml. water in which they emerged plus one ml. sterile, distilled water.

oxytocic constituent. Similarly, Pitressin, a fraction of the hypophyseal hormone[2] that appears to have a strong constrictive effect on coronary vessels, exhibited considerable activity in immobilizing cercariae. This would seem to indicate that the coronary contractive effect of *C. foetidissima* may be involved also in the effect on cercariae.

The leaves of a specie of the Yucca plant are reported to contain traces of saponins and sterols and the activity of an infusion of Yucca leaves, as shown in Table I, might be explained on the same basis as that for *C. foetidissima.*

CONCLUSIONS

The author recognizes the very limited scope of the experiments reported herein. However, it is his opinion that they provide some leads, and that research with oxytocic

and cardiac glycoside drugs and/or their derivatives, might be profitably undertaken to develop a drug which could be administered orally for suppressing the development of schistosome cercariae in individuals exposed to cercarial infection. It is suggested that research of this nature on extracts of other species of the Claviceps fungus might yield some drugs better suited for human administration than the ergot alkaloids and their derivatives. The author is not acquainted with any investigation on the activity of the broad spectrum antibiotics against schistosoma cercariae, but in view of the successful therapy of amebiasis with fumagillin, an antibiotic isolated from *Aspergillus fumigatus,* some experiments on the cercaricidal action of that drug are indicated. The possible anticercarial activity of the cardiac glycosides and aglycones also seems worthy of additional research.

Although the drugs and substances tested in these experiments show an inhibitive effect on *S. mansoni* cercariae, further *in vivo* investigations appear desirable to determine whether the affected organisms, when in a favorable environment, would recover sufficiently to complete their development into adult schistosomes.

Summary

Preliminary tests were undertaken to determine the effect of several drugs and substances exhibiting oxytocic and cardiac constrictive activity on the mobility of *S. mansoni* cercariae. Ergonovine, Pitocin, Pitressin and the extracts of Yucca leaves and of *Cucurbita foetidissima* root were found to immobilize cercariae in dilutions of one to twenty million after five minutes exposure in *in vitro* experiments.

Two 0.5 gm. tablets of Chloroquin diphosphate representing 0.6 gm. of base, were dissolved for one hour in 10 milliliters of sterile, distilled water, and filtered. One milliliter of filtrate diluted 10^{-7} did not have any apparent effect on the mobility of cercariae in any of the concentrations tested, after one hour's exposure.

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The author is especially grateful to Dr. Glenn E. Ullyot, Head, Chemical Laboratory, Smith, Kline and French Laboratories, for his continued interest in and encouragement to the writer's independent research on the possible usefulness of plants indigenous to the United States, as sources of new drugs.

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To Robert E. and Howard E. Cottle, the author is grateful for their unstinted assistance in making preparations for the voyage to Puerto Rico, without which this research could not have been undertaken.

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"It is my conviction that the role of the Federal Government should be to encourage the further growth of voluntary insurance in every sound way. This administration believes that health insurance can advance most effectively through voluntary action and has encouraged the strengthening and extension of voluntary health insurance. Legislative proposals in the health insurance field have been consistent with that policy. While some legislation is needed to stimulate growth in certain areas and for certain groups, we believe that the greatest gains will stem from the creative effort of free enterprise."

AIMS C. MCGUINESS, M.D., *Special Assistant to the Secretary for Health and Medical Affairs, U. S. Dep't of Health, Education, and Welfare.* From address before St. Louis Medical Society, May 21, 1957.

Air Force Survival Feeding

By

LT. COLONEL ALBERT A. TAYLOR, USAF (VC)

AND

HARRY C. DYME, PH.D.*

(With seven illustrations)

INTRODUCTION

EMERGENCY feeding must not merely prevent death from starvation or malnutrition but it must also augment the castaway's ability to survive. A castaway's survival potential is his ability to withstand the compound stress of an emergency situation. Since other components of a survival kit, as well as the entire kit (weight and bulk), are designed for the normal individual, sustenance must strive to maintain that normality. Survival efficiency may be lowered by nutritional abuse, and under extreme conditions the value of the survival gear may be completely nullified through abandonment. Food, therefore, plays a significant role in the individual's ability to survive.

SURVIVAL FOOD PACKETS IN USE

The United States Air Force is currently using a different survival food packet for each of three situations. One is designed primarily for situations where water may be limited and physical effort will not be great, such as sea survival. Another is intended for use where considerable effort must be expended and water will not be a problem, such as Arctic survival. A third is intended for use in areas where water will not be severely limited and a moderate amount of physical effort may be necessary, such as a temperate zone land survival.

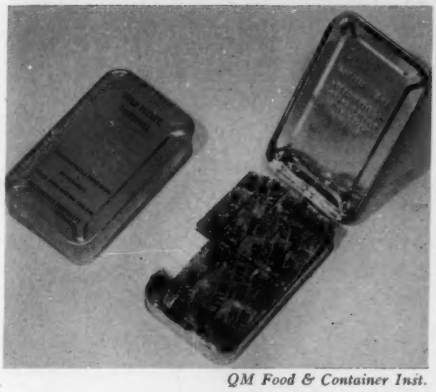
The *Food Packet, Survival, Tropic* weighs 1 lb. 8 oz. (Figures 1 and 2) It contains starch jelly bars, coffee, tea, and sugar.† It should be used when: (1) less than two pints of water or other liquid is available per day, (2) less than one half a food packet per man per day is available, and (3) light or no work is required.

The *Food Packet, Survival, Arctic* weighs 1 lb. 7 oz. (Figures 3 and 4) It contains cereal bars, fruitcake bars, cheese bars, chocolate bars, starch jelly bars, coffee, tea, cream, and sugar. It should be used when: (1) two pints or more of water or other liquid is available per day, (2) one food packet per man per day is available, and (3) moderate work is required.

The *Ration, Survival Individual* weighs 2 lbs. 1 oz. (Figures 5 and 6) It contains meat food product bars, cereal bars, fruitcake bar, coffee, tea, sugar, and onion and chili powders for seasoning the meat. The Ration, Survival Individual, consists mainly of pemmican-type meat food bars. These are edible in the cold state, but onion and chili powders are provided for flavoring when opportunity permits making the bars into a hot gruel. The history of pemmican (a mixture of sun-dried lean meat and rendered fat) goes back to the American Indians, who used it as food between hunting seasons, as an emergency ration on long journeys, and as their military ration. Early explorers, including Admiral Perry, used considerable amounts of pemmican with hard bread and tea on their Arctic expeditions. The present ration resembles pemmican in its high percentage of fat and in its high caloric density, but its flavor and texture have been improved. It has good stability and lends itself well to emergencies. From a physiological standpoint, it is necessary that considerable amounts of water be consumed with this ration. This food packet should be used when: (1) three pints or more of water or other

* Aero Medical Laboratory, Wright Air Development Center, Wright-Patterson Air Force Base, Ohio.

† Food items for survival feeding were developed for the Air Force by the Quartermaster Food and Container Institute for the Armed Forces.



QM Food & Container Inst.

FIG. 1. Food Packet, Survival, Tropic, ST-3.

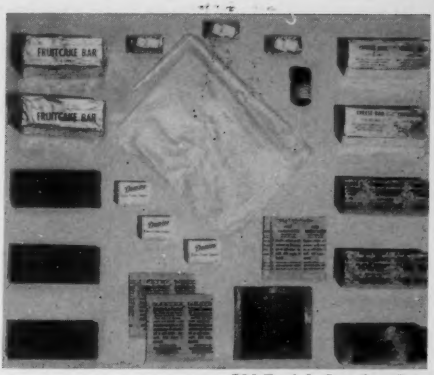


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FIG. 4. Components of Food Packet, Survival, Arctic, SA-4.

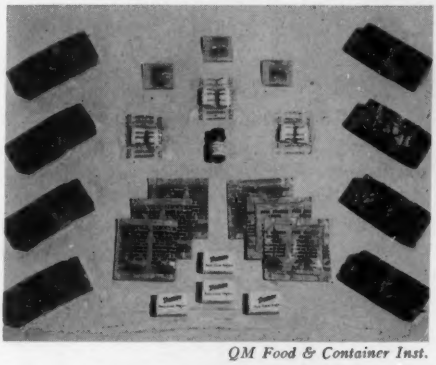

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FIG. 2. Components of Food Packet, Survival, Tropic, ST-3.

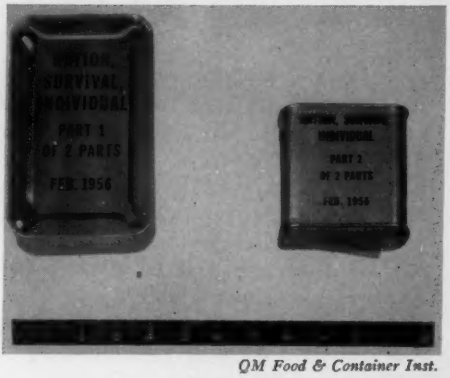

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FIG. 5. Ration, Survival Individual, RS-2.

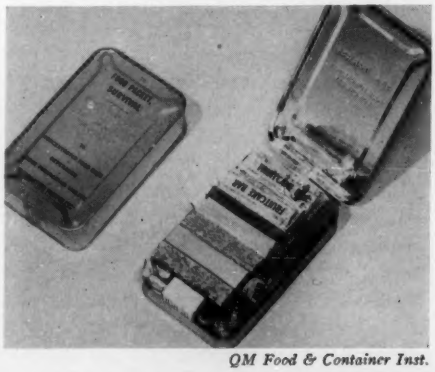

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FIG. 3. Packet, Survival, Arctic, SA-4.

liquid are available per man per day, (2) at least one half the contents of the ration packet is available per man per day, and (3) hard work is required.

A configuration for packaging this ration in two metal containers has been developed. This has improved stability, increased compactness, and provided a vessel for drinking and cooking.

Results of a survey, recently compiled, show that acceptability of this ration is quite low.

CONCEPT OF AN ALL PURPOSE SURVIVAL FOOD PACKET

U. S. Air Force Statement of Military Characteristics, No. 125, titled "Ration,

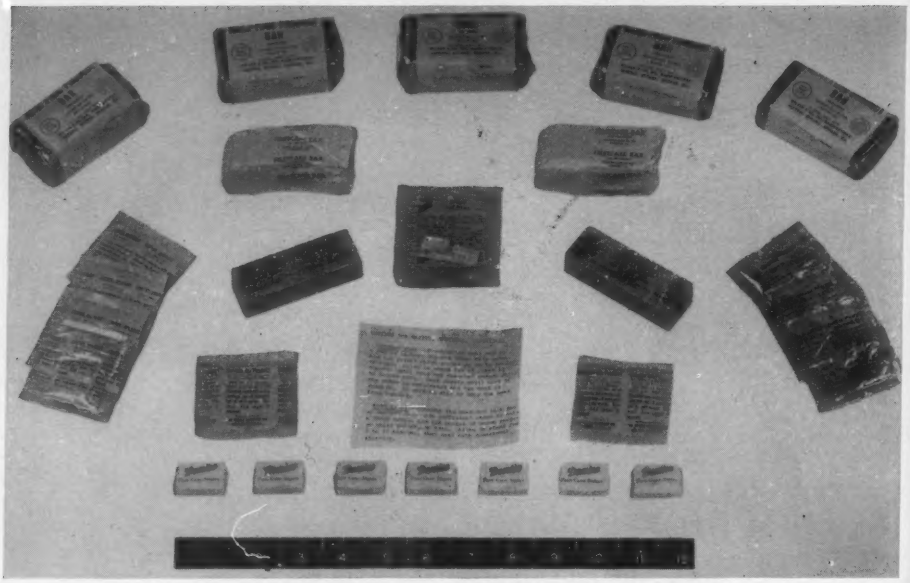

FIG. 6. Components of Ration, Survival Individual, RS-2.

Survival, All-Purpose, All-Climatic, Global" was published 26 July 1951 and revised slightly 20 August 1954. Its purpose is to provide a stable emergency food packet capable of sustaining life during a period of emergency survival, regardless of geographic location or climatic condition. Food components must possess nutritional properties most conducive to proper retention of physical stamina and mental capability during a minimum period of four days of subnormal caloric intake and limited water supply under conditions simulating evasion and escape operations, and ten days of subnormal caloric intake and limited water supply during conditions simulating static type survival. This survival food packet is intended to fill the needs of all the U. S. Military Forces.

In order to keep pace with the increasing range of aircraft and the changing operational conditions, research is in progress to develop a survival food packet which will be effective in any type of survival situation. An all-purpose survival food packet is necessary because on long-range missions, aircrews cover terrain of various types, yet can carry only one kind of food packet. In addition, the logistical advantage of stock piling only one type of survival food packet is apparent. Basic knowledge as to the best proportion of carbohydrates, proteins, and fats is not yet completely available. A prototype of this all-purpose ration, based upon the most current available information, is being formulated to fill the immediate operational and logistical need. This prototype will be revised as the results of current physiological research become available.

A nutritional design for an all-purpose survival food packet which appears promising is based on a food unit of several bars of uniform nutrient composition. Seven to eight percent of the calories are supplied by protein, eighty percent of the fuel value will be derived from carbohydrate, and the remainder from fat. Because of the uniform nutrient composition, the unit may be employed in any numbers with the maximum benefit from the protein constituents in each instance; while consumption of only one unit will not significantly increase water requirements. The flexibility afforded by this design allows the issue to be adjusted in

accordance with the user's anticipated energy output and other considerations.

Seven experimental food bars embodying this design, each with the same basic nutrient composition, have been formulated for a prototype all-purpose survival food packet. Only one of these bars, chocolate fudge, is a confection. The others include a potato chip bar, a meat cereal bar containing dehydrated smoked beef and dehydrated cracker-meal, a cheese bar with dehydrated cheese and potatoes, a cereal bar, a fruit bar with dehydrated apples, apricots, raisins and cornflakes, and a fruitcake bar. The bars are compressed for most efficient utilization of the space afforded by a commercially available 12-ounce luncheon meat can.

Physiological Research Toward an All-Purpose Survival Food Packet

Previous experiments on survival foods have been on a small scale. These experiments have usually tested one or two of the possible nutrient combinations which have been advanced for survival foods. These foods have usually been tested under a single survival situation and the effects of the food on the human under these conditions have been analyzed in different ways. The experiments are difficult to analyze together since there is little similarity in their design.

To carry out a program to secure guiding information for the development of an *All-Purpose Survival Food Packet,* the Air Force contracted with the University of Illinois. This study was to establish the nutritional characteristics of the best possible survival ration for use in all emergencies by means of large-scale field tests which would permit judgments to be made on the survival potential of castaways.

In the experimental design, Dr. Robert E. Johnson and Dr. Frederick Sargent II of the University of Illinois emphasized four major variables. These were water intake; caloric intake; the ratios of proteins, carbohydrates, and fats; and caloric expenditure. Nutrient combinations were devised by combining various levels of caloric intake; various ratios of fats, carbohydrates, and proteins; and two levels of caloric expenditure and water intake. Arrangements were made for large numbers of nutrient balance measurements, tests of organ functions, clinical observations, and chemical measurements of blood and excreta.

The first phase of the study was conducted from December 1952 through June 1953 on the campus of the University of Illinois at Urbana.[1] Twelve students served as subjects for this test conducted under temperate conditions. This phase of the study had two major aims. The first was to extend previous knowledge of survival rations by considering the effects of the four major variables on human subjects, with the emphasis principally on bodily efficiency and the functioning of organ systems. Second, the data from these normal young men exposed to no undue stress of weather or work, served as control data for the interpretation of results derived from subsequent studies conducted under field conditions.

This temperate study emphasized three major facts: (1) to arrive at conclusive judgments, the projected field trials should be conducted; (2) the castaway should be provided adequate amounts of all vitamins, and water in amounts as liberal as possible; (3) the all-purpose survival food packet should be planned to provide a minimum of 2,000 calories with a distribution approximating 15% protein, 52% carbohydrate and 33% fat. Results of this study also furnished control data for the field trials.

A highly practical and efficient experimental design was devised to take into account all of the major variables. Two major groups were set up; one group was to have water ad libitum while the other was to be restricted to 900 ml./day. A further delineation was made within these two groups according to work levels simulating static and evasive survival situations. The design up to this point then, included four major groups: (1) unlimited water—light work, (2) unlimited water—heavy work, (3) limited water—light work, and (4) limited water—heavy work. Within each of these major groups, further breakdowns were

made according to total caloric intake ranging from starvation to 3,000 calories. Under each caloric level, provisions were made for various nutrient combinations.

The next phase of the study conducted was a winter trial. This test took place at Camp McCoy, Wisconsin, early in 1954 with 87 volunteer airmen acting as test subjects. The actual two-week experimental phase was preceded by a two-week preperiod during which all administrative procedures and indoctrination of the subjects was accomplished, and control or base line physiological data were obtained. During a similar time after the experimental period, the progress of the subjects' rehabilitation was observed. The diets during the actual testing stage consisted of menus derived from existing operational food packets. A-rations were used in the pre- and post-experimental periods.[2]

The observations made during the experimental period consisted of groups of tests evaluating the body as a whole, energy and nutrient metabolism, endocrine status, central and autonomic nervous systems, hematology, and liver, kidney, cardiac, gastrointestinal and respiratory function.

The evaluation of the laboratory analysis of specimens and results of the many tests have been summarized. This trial again indicated that the 15/52/33 nutrient combination was the most effective, and that total caloric intake should be 2,000 calories or more, if possible. Water in amounts as liberal as possible should also be provided. This study also showed that certain components of operational food packets such as the meat bar and cereal biscuit produce actual clinical symptoms. If they are to be incorporated in survival rations, they should be modified to eliminate these undesirable characteristics.

In order to simplify the mass of data accumulated in this trial, relative body damage to the subjects was measured by assigning values to the results of the physiological tests. These values were then tabulated and rank ordered. The subjects showing the highest total value were those whose bodily efficiency was most impaired. Figure 7 illustrates the results of the winter trial. The nutrient combinations used were: A. 30/0/70 protein/carbohydrate/fat ratio, a high protein-high fat diet, equivalent to the meat food product bar in Ration Survival, Individual; B. 15/52/33 ratio, a fairly normal mixture; C. 2/20/78 ratio, a high fat diet being considered because of its high energy value per unit of weight; D. 0/100/0 ratio, a pure carbohydrate diet equivalent to the Food Packet, Survival, Tropic.

These ratios are in terms of percent of calories derived from proteins, carbohydrates, and fats.

The chart shows that the *B* combination provides the best diet for the majority of situations. Another fact illustrated is that bodily efficiency is less impaired as daily caloric intake is increased. Although it has long been known that a limited water intake produces harmful effects, this study further supports the facts. The differences between light and heavy work are less pronounced using the *B* combination than any other combination when unlimited water is available.

It is seen that the *B* combination, for the majority of situations involving variations in work levels and water and caloric intake, is the best of the diets studied.

In June of 1955 a summer study was begun at Camp Atterbury, Indiana.[3] Volunteer airmen, 100 in all, again acted as test subjects for the experiment. The summer phase utilized the same experimental design that proved so effective during the winter trial with approximately the same diets, work levels, and testing procedures. The one major variable was the weather. There is every reason to believe that the data derived from this summer phase will be the most comprehensive and valid compiled in the complete study.

With the compilation of the data derived from the completed summer trial, a final report will be forthcoming in the near future. The conclusions reached from the complete study will guide the development

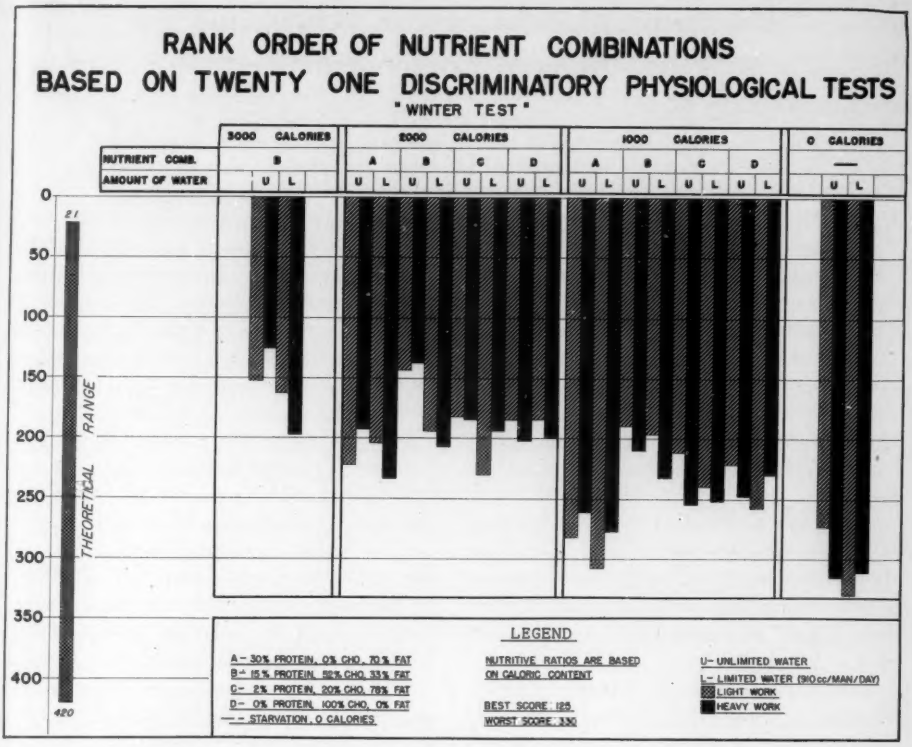

FIG. 7.

of an all-purpose, all-weather, global survival ration.

In summary, a comprehensive test was designed to measure the effects of various protein, carbohydrate, fat ratios with variables of water intake, caloric intake and work output. The test was repeated under mild, cold, and hot weather conditions. The means of differentiating the effects of these food combinations under the varying conditions was established during the first mild weather phase. Twenty-one different physiological measurements ranging from body weight to blood ascorbic acid were found to change significantly. Testing under this program has been completed. Reports of the mild weather and cold weather phases have been published. A report of the hot weather phase is in preparation.

This study will be of great value in: (a) establishing emergency nutritional requirements and tolerance limits, (b) evaluating the nutritional aspects of operational requests for special types of emergency feeding, and (c) guiding the development of survival food packets—in general, and the all-purpose survival ration in particular. Knowledge from this study will guide the critical nutritional compromise necessary to achieve the operational and logistical advantage of a single survival ration.

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The Army Medical Service School and the Reserve Components

By

LIEUTENANT COLONEL EDWIN S. MARSH*
Medical Service Corps, United States Army

THIRTY-SEVEN years have passed since the Army Medical Service School was first established as the Medical Field Service School[1] at Carlisle Barracks, Pennsylvania. Today one of the most valued links between old and new is a worn ledger book reposing in the School's student record branch. In it are listed, in beautifully written copper-plate script, the names of the officer and noncommissioned officer graduates of the period preceding World War II.

Listed in the front of the old ledger are 88 names, representing the graduates of the first course conducted by the newly opened school. The course, a special basic for officers, lasted for seven weeks, from June 1 to July 19, 1921.

Understandably, the first course was primarily for Regular Army officers. However, following numbers 86 and 87 in the diploma register are the names of Major Jefferson B. Latta and Captain William E. Huddleston, both medical officers, representing the New York and Texas National Guard respectively.

The inclusion of these two officers among the graduates of the old Medical Field Service School's first class and the subsequent inclusion of six Reserve and additional National Guard officers in the course conducted the following year are significant because it demonstrates a fact well-known to anyone familiar with the School's history—that the School has traditionally been concerned with its training responsibilities for active and inactive components of the Army Medical Service alike.

It is not surprising that this should be so. For one thing, the Army Medical Service had a reserve long before the Army as a whole. The formation of a Medical Reserve Corps was urged by The Surgeon General in 1903 and finally authorized by Congress in 1908—eight years before the Army General Staff secured the inclusion of similar authority for all arms and services in the National Defense Act of 1916.

By 1909—only one year after the Medical Reserve Corps authorization—The Surgeon General was able to report the success of the new organization in his annual report:[2]

"The hopes expressed in last year's report that the patriotism of numbers of distinguished physicians would operate to induce them to head the Medical Reserve Corps have been amply justified by the outcome. The list of these gentlemen, now on the inactive list of the Reserve Corps, contains many names which are well known in scientific circles throughout the world. As a practical example of the value of the service of these officers, it has been noted that when it was necessary to assemble a board to investigate the important subject of inoculation for typhoid fever it was possible to do so without going outside of the Medical Reserve Corps, while at the same time it is doubtful if a better qualified board could have been assembled in this or any country."

The result of this early enthusiasm was that the Army Medical Service was substantially alone among all the branches of the service in having a reserve actually in being when the United States entered World War I. To a great extent, these early Medical Reserve Corps pioneers constituted the cadre around which the medical service of the American Expeditionary Force was formed. To a greater extent, their affiliation formed a model for the reception of thousands of other civilian physicians into the

* From the Department of Training Doctrine, Army Medical Service School, Brooke Army Medical Center, Fort Sam Houston, Texas.

Army Medical Service for wartime duty.

Thus, the Army Medical Service emerged from World War I with considerable pride in its reserve and, possibly, even more pride in itself for its collective ingenuity in originating the reserve concept. And, despite inequities in promotion, failures in fully utilizing specialized skills, and many administrative frustrations, once the reorganization of the reserve was begun many of its distinguished members apparently philosophically agreed with General Sherman's estimate of war and, blaming the errors of commission and omission of this characteristic, signed up once more.

One very important lesson was learned from World War I experience, however. That was the clearly evident necessity of training Army Medical Service officers, Regular, National Guard, and Reserve alike, in the growing complexities of field medical service.

This concept of training was of comparatively recent origin. Prior to World War I, despite the experiences of both the Civil and Spanish-American wars, the idea was still widely prevalent that a good physician would make a good military surgeon with a minimum of retooling. During the period between the Spanish-American and World War I, the Army Medical Service itself had concentrated on advancing its professional know-how and had skillfully employed the Army Medical School in Washington to this end. However, little or no provision had been made for formal training in medical tactics or problems of field medicine.

Surgeon General O'Reilly reflected the prevailing diffidence that existed in this field when he discussed his new Medical Reserve Corps for the first time in his annual report for 1908:[3]

". . . it will probably become necessary at some time in the future to offer financial compensation as a retainer for Reserve officers, especially should it prove desirable to ask these officers, or some portion of them, to come out for training for a short period each year.

"This training would not be required of the eminent medical men who have already accepted commissions on the inactive list of the Reserve Corps and who could not be expected to sacrifice the time from their professional work, but would be highly desirable for the younger officers not yet established in practice."

But, with the reorganization that followed World War I, this diffidence disappeared. Certainly Major General Merritte W. Ireland, the first postwar Surgeon General, who had headed the medical service of the AEF, was a staunch advocate of field training. So too were the great majority of Army Medical Service officers, active and inactive alike; although, even as late as 1936 they were to be affronted by a general order issued just prior to the Second Army maneuvers of that year which stated under the heading "Essentials of Training for Medical Troops":[4]

"The prime requisite for a medical officer is that he shall be a doctor-surgeon. The rest of it can take care of itself."

In any event, this well-recognized need resulted in the establishment of the Medical Field Service School in 1920.

General Ireland explained the origin of the new school as follows in his annual report for 1922:[5]

"The medical department has for some years realized the need for something in the nature of a field service school, a place in which medical department officers could be taught practically and early in their careers the elements of the military side of their work. It was recognized that the early teaching of that kind would hasten the officers' adjustment to his new and peculiar work, would save him much embarrassment and many hard knocks that necessarily attend learning merely through mistakes and experience, and would the sooner fit him into his place as a part of the military machine and make him a smoothly functioning part.

"The Army Medical School has not been able to do quite all of this because of the requirement of its time and facilities for

special and needed postgraduate medical work and because of its location in the city of Washington and lack of room and facilities for instruction in field work."

A few years later, an early commandant of the school, Lt. Colonel Charles R. Reynolds,[6] expressed the need for the institution more concisely when he said it was born of a lack of "adequate facilities for teaching what must be recognized as one of the main functions of the Medical Department—preparation for war."

There was never any serious doubt that the new school had an important responsibility as far as the training of National Guard and Reserve personnel was concerned.

In 1921, the Wellcome first prize award was won by Major Mahlon Ashford with his essay on "Medical Reserve Systems."[7] In his essay, he describes the function of the new school and adds this pertinent comment:

"It behooves the Medical Department of the Army to make these courses attractive to the Medical Reserve Corps since the pressing desire of reservists for such courses will certainly result in increased opportunities for their instruction, and in this way one more link unifying the reserves and regulars will be forged."

Later in his essay, however, he adds a more somber note, which will receive additional consideration as we proceed in this discussion:

"The question of training reserve officers is one of the most perplexing of the many difficulties in the development of a Citizens Reserve. The great body of men in civil life here have not time to devote a measurable portion of the calendar year to military instruction even if public funds were available for this costly project."

The role of the school in this field was again recognized by The Surgeon General in his report for 1924[8] when he stated:

"The Medical Field Service School at Carlisle Barracks during the past year has carried on the courses previously conducted and has developed along the lines of its greatest usefulness—the education of Reserve officers. . . ."

Similarly, Colonel Reynolds in his previously cited article commented:

"It has for a long time been apparent that the greatest usefulness of the Medical Field Service School lies in the training of the Officers' Reserve Corps which will comprise a large portion of the Medical, Dental, and Veterinary professions of the country."

It might be well to consider at this time exactly what the contributions of the Medical Field Service School to personnel of the Organized Reserves and National Guard included during the twenties and thirties.

Probably the most important contribution, although it applied to Regular and Reservist alike, was the formulation of doctrine. During the first decade of the School's existence, the reserve components as well as the school were largely staffed by veterans of World War I. Indeed, one representative of a reserve officer encampment at Carlisle Barracks writing during this period to his local medical journal describes his group as having an average age of 53.[9] Consequently, the reservists and their Regular Army confreres of the period were experienced. What they lacked was both time and opportunity to sift good from bad, sound tactical doctrine from dubious local combat improvisations.

A faculty, whether it be in a civilian university or an Army service school, has an extraordinarily good opportunity to do just this. For, no matter how busy its members—and the early Medical Field Service School faculty was small and its instructors usually wore several "hats"—as teachers, they must consider the implications of what they teach. This analysis of medical field service principles and practices from the School's very beginning led to the preparation of school texts, Medical Department bulletins, and War Department publications covering many facets of the field. Training schedules, lesson plans, and other information prepared by the faculty for use at the school also proved of great interest to the commanders of remote National Guard and Organized Reserve medical units.

In his report for 1924, General Ireland suggests that this part of the School's en-

deavors had already proven almost embarrassingly successful:[10]

"In order to successfully meet the demands from many officers from all components of the Medical Department for instructional material covering every known subject and for advice and suggestions in connection with the conducting of instruction and training of all kinds the School has published during the past year five pamphlets which have been freely distributed to meet these demands. These pamphlets are as follows: 'Medical and Line Tactics,' 'The Medical Regiment,' 'Field Hygiene and Sanitation,' 'Rail and Motor Transportation,' and 'Elements of Administration for Medical Department Officers.' In addition to the above pamphlets, the School has undertaken to supply programs of instruction, schedules for training camps, lesson sheets, and instruction material in all departments of the schoolwork to those officers who are giving instruction to the Medical Department units of the Regular Army, Organized Reserves, and National Guard. An effort has been made to supply all applicants with what they want. Owing to the fact that the School does not maintain a book department and no charges have been made for the publications that have been sent out, it has frequently been necessary to deny applicants on account of the lack of funds to publish these pamphlets in greater quantity. The field for good work in this connection is almost unlimited, and every effort is being made to extend this feature of the School's work."

The state of penury mentioned above—which was not, incidentally, unique to either the Medical Field Service School or the Medical Department at the time—had its influences on other phases of the School's work as well.

Early in this discussion, the inclusion of two National Guard officers as students in the School's first course was mentioned. Their presence actually established a precedent, and the following year saw the first of a series of special courses conducted for National Guard and Reserve officers which continued under various titles and with varying duration until the outbreak of World War II.

For the period extending from 1921 to the middle of 1940, graduates of these special courses totalled 324, of whom 181 were National Guard and 143 Reserve officers.[11] For the most part they were Medical Corps officers, although there were occasional representatives from all corps. Four National Guard and one Reserve officer, for example, constituted the total contingent of the Medical Administrative Corps for the entire period.

A more careful analysis of school records also reflects the effect of the Depression on this particular phase of the School's activities. For two years (1933 and 1934), because of stringent economy measures, no courses were conducted for non-Regular officers, although one Reserve officer did attend the regular, full-length basic course in 1933. The low fiscal priority of the Organized Reserve, even compared with the National Guard, is further evidenced by the fact that no Reserve officers attended the School at all from 1934 through 1938, although National Guard officers attended from 1935 on.

Thus, while Major Ashford in his Welcome essay was mainly concerned with the problem of "men in civil life who have not time to devote a measurable portion of the calendar year to military instruction" and only incidentally concerned with the availability of "public funds . . . for this costly project," in actual practice, with a grimly economy-minded and isolationist Congress, the reverse became true. There were always public-spirited reservists willing to sacrifice their time for school training. There were always insufficient funds and often no funds at all available for their training.

Incidentally, in the field of resident instruction, the Medical Field Service School performed another valuable service during this period. Two hundred National Guard noncommissioned officers were graduated from the enlisted courses of the School. Their attendance included every year from

1925 to 1940, except for 1933 and 1934 when this service of the School also fell prey to the effects of the Depression.

With microscopic appropriations for reserve training, it was not surprising that correspondence courses were evolved as one of the early responsibilities of the school. What these courses lacked in actual access to instructors, troop demonstrations, and visual aids was more than offset by economy, simplicity of administration, and accessibility for the unpaid reservist.

The first announcement of the new Army correspondence course was published in 1922,[12] and included two courses: Medical Corps Course "A", which totalled 195 hours and included subcourses covering post duties, organization and tactical employment of line troops, service with the medical regiment, hospitalization, sanitary devices, first aid, and military law; Medical Corps Course "B", which totalled 39 hours and was comprised of a single subcourse covering advanced tactics and techniques.

In his report for 1923,[13] The Surgeon General described the role of the new course as follows:

"It is the purpose of this course to give the student a knowledge of the duties which every Medical Department officer of the Army may be called upon to perform soon after his entry upon active service."

Although the preparation of the material was a responsibility of the Medical Field Service School, the enrollment and actual administration of the material was decentralized to the nine corps areas into which the Army was then divided.

Army correspondence courses won an immediate popularity with reserve component officers. Starting in 1922 with an initial enrollment of 4, by the following year enrollment had climbed to 2,193.[14] Both the scope and material of the courses remained under constant critical examination by the Medical Field Service School, The Surgeon General's Office, and the War Department. Consequently, the courses soon began to bear a closer resemblance to present extension courses. In 1925, a correspondence department was established at the School, and the School Secretary was designated as director in addition to his other duties.[15] By 1927, enrollment by inactive personnel had risen to 3,739.[16] The enrollment continued to increase and ten years later, The Surgeon General reported the following breakdown of correspondence course enrollment:[17]

National Guard Medical Department officers	981
Reserve Medical Department officers	9,247
National Guard enlisted men	735
Organized Reserve enlisted men	20
Total Reserve and National Guard enrollment	10,983

If to the distribution of training literature, the many resident courses conducted, and the preparation of Army correspondence courses one adds the numerous summer encampments held at Carlisle Barracks for Reserve officers and ROTC cadets, a fair picture evolves of how much of the School's effort was actually directed to the support of reserve components. Certainly, one cannot avoid the impression that medical personnel and units of the Organized Reserve and National Guard would have been far less prepared for the initial national emergency in 1940 and the actual outbreak of hostilities in 1941 had it not been for the continuing influence of the School, both direct and indirect.

The Presidential proclamation of a national emergency marked the end of an era as far as the Medical Field Service School was concerned—with its more contemplative functions sacrificed to prepare for the approaching mobilization. As a result of the national mobilization, regular courses of instruction were discontinued. In keeping with the need of training as many officers as possible in the short time available, an Officer's Refresher Course was instituted. The first refresher course began December 9, 1940 with 161 Reserve officers enrolled and by the end of 1941, these refresher courses had prepared a total of 368 National Guard and 1,140 Reserve officers for

active duty. With the outbreak of World War II, the mission of the School became increasingly one of providing initial military orientation to newly commissioned officers and to the training of officer candidates to meet the suddenly skyrocketing requirements for Medical Administrative Corps officers.

It is not the purpose of this discussion to relate the role of the Medical Field Service School in the ultimate successful conclusion of World War II. Certainly school graduates played key roles in the development of new medical tactics and technique needed to meet the problems presented by widely varying combat and environmental conditions throughout the many theaters of this global war.

The close of World War II marked the beginning of another reorganization of the Reserve and National Guard. However, there was a decided contrast between this reorganization and the one following World War I. There were, for example, no post-World War Wellcome award essays on the opportunities for reserve service. There was not, as a matter of fact, any appreciable literature on the Army Medical Service reserve establishment until early in the present decade.

There were a number of reasons for this difference. Some will be cited here. Others can be added by even the most casual student of the period.

World War I was comparatively limited both in time and scope. It was, in the minds of many observers, the *final* war—the "war to make the world safe for democracy." Thus, reestablishing old Reserve or National Guard associations was much more in the nature of joining a favorite lodge than facing the prospect of imminent recall to active military service. World War II was limited neither in time nor in scope. To many National Guardsmen and Reservists called into service in 1940, it lasted for five or six years. It took place on a truly global scale, often in the least attractive portions of the globe. It concluded with no widespread illusions as to its finality. In fact, the maintenance of large-scale quasi-permanent occupation forces could be anticipated prior to either V-E or V-J days. The war was barely over before the threatening presence of the Soviet Union had made itself felt. Only a few years later, combat in Korea was to prove the validity of these fears.

These were all pertinent factors. To one who had been separated from wife or family for five or six years or who had waited for that period to establish his own family, the prospect of voluntarily joining an organization that might interfere with his further enjoyment of civilian life certainly lacked much of the dash and old school tie spirit that had been manifested in the comparable period following World War I.

But, there were other complicating factors, too. Following World War I, one was either Regular Army and thus on active duty, or one was Reserve or National Guard and consequently on inactive status. The post-World War II period with its requirement for a larger active force than the United States had ever maintained in nominal peacetime destroyed these simple distinctions. There were, in fact, Reserve and National Guard personnel who were not on active duty. But, in addition to Regular Army personnel, there were Reserve and National Guard officers serving on extended active duty, many of whom were planning permanent careers in the service.

The Army Medical Service's own acute postwar shortage of professional officers was another element in this problem. During much of the postwar period, the problem of even providing minimal medical and dental care for the Active Army was so acute that The Surgeon General's Office was forced to use every type of persuasion, including not only blandishments but legislative duress as well, to procure physicians and dentists for tours of active duty. Thus, while in the period following World War I the fact that a young physician or dentist was planning to fill a vacancy in the Reserve or National Guard would fill his Regular compatriots with satisfaction, the situation was far dif-

ferent during much of the post-World War II period. The Army Medical Service recognized the extreme importance of a properly manned and trained Reserve and National Guard, but the immediate problem was so grave as to make an inactive affiliation by a young officer a definite threat to the program for manning the active establishment.

Even the so-called "inactive reserve" components grew in complexity. Prior to World War II, the National Guardsman with his regular weekly drills and annual summer encampment might well have complained about sharing an "inactive" tag with his Reserve brother, who attended irregular assemblies and was ordered for summer training only once every three or four years. However by the time the post-World War II Reserve reorganization was completed, many reservists might well have been equally resentful of the term "inactive." The Reserves, now organized as the United States Army Reserve, ran almost the entire gamut from inactivity to activity. There was, for example, the Standby Reserve, which was in fact largely inactive. The Ready Reserve, however, which theoretically sheltered the more active of the citizen soldiery, included groups which attended 48, 24 and 12 paid drills in addition to summer encampments, plus a large group whose assignment to the Ready Reserve was purely titular. Members of the latter group, following tours of active duty, were assigned to the Ready Reserve to satisfy residual statutory requirements but had no obligation for actual participation in the Reserve program.

The experiences of World War II veterans complicated the problems of reorganizing the postwar reserve establishment. Its multifaceted organizational structure created semantic problems that complicated the recapture of simpler post-World War I loyalties and allegiances.

Even these complications fade into comparative obscurity, however, when compared with the postwar training responsibilities for all of the components of the Army of the United States.

Several things were clearly evident by the close of World War II. The United States required a peacetime army larger than ever conceived in the past, both active and inactive. It was evident that modern strategy would no longer afford the United States prolonged periods for gradual mobilization. In addition, this army must be technically trained far beyond anything previously attempted. This was not, of course, simply because of the atomic bombs dropped at Hiroshima and Nagasaki nor because of the larger nuclear weapons later devised and tested. Rather it began with the first German "blitzkrieg" and had grown ever since. Now the Army must be capable of amphibious and airborne attacks, it must be adept in the use of armor, it must master the great mass of electronic and other gear necessary for the operation of antiaircraft and guided missiles and for the maintenance of combat communications. It must be prepared to cope with the new logistical problems of combat forces with their insatiable appetites for gasoline, ammunition, and thousands of other items—all on a scale of such magnitude that it would have been unbelievable to the pre-World War II army planner. The new Army must be prepared to mobilize fast. And, once mobilized, be ready to meet the exacting requirements of modern warfare.

New requirements were early reflected in the postwar troop program of both the National Guard and Army Reserve. National Guardsmen who before World War II had manned only divisional tank companies equipped with handfuls of antique 1918 tanks were organized into armored divisions. Antiaircraft units employing the latest weapons and fire control equipment were organized in large numbers. Similar units were organized in the Army Reserve.

Although the organization of medical units in the postwar National Guard and Reserve structure showed little fundamental change, the responsibilities of professional and paraprofessional personnel had increased greatly. In the early days following World War I, knowledge of "the organization of the line"

was considered adequate for the combat medical officer. This no longer held true. Now knowledge of armored, airborne, and amphibious principles and techniques became of great importance in the provision of adequate medical care. And, above and beyond all of this, was the threat poised by thermonuclear weapons and the necessity for familiarity with the fantastically involved principles necessary for the care of the wholesale casualties which these weapons threatened.

It was in part to meet this challenge that the War Department Military Education Board was formed shortly after V-J day, under the chairmanship of Lieutenant General Leonard T. Gerow.

By early in 1946, the Gerow Board had recommended a progressive system of education for all Army commissioned personnel which would extend throughout every officer's tour of service. The findings of the board were substantially approved by the then Chief of Staff, General of the Army Dwight D. Eisenhower, and by Secretary of War Robert Patterson.[18]

The educational program provided for a nine-month basic course for new officers, consisting of four months of common instruction in a general school, followed by five additional months in a branch school. Later, as senior company grade officers, they would return to their branch schools for a ten-month advanced course. After this would follow the Command and General Staff College and the Army's other advanced schools.

These courses were intended primarily for Regular Army officers. However, the same system was to be followed for both National Guard and Reserve officers, with associate courses of three months' duration provided both at the basic and advanced levels.

The initial announcement carried this special proviso:

"Although the associate and extension courses are intended primarily for the progressive education of National Guard and Reserve officers, the regular courses will also be open to those groups whenever attendance for the regular course is practical."

Here then was an extensive program of resident instruction at the Army's service schools for officers on both active and inactive status. In considering its final disposition, it is important to recognize that the program was adopted before the Army's first postwar Regular Army officer integration became effective, and, quite likely, before it was possible to fully anticipate the sustained polyglot composition of today's Active Army.

At any rate, very few officers not on extended active duty have ever been able to attend either associate or regular courses. Actually, the commitments of the Army have been such that the program as applied to Regular officers has required considerable modification. And, the very size of the Active Army and the necessity for giving its officers priority in training has served to almost entirely limit resident instruction to this group. Generally speaking, Regular officers have attended the regular basic and advanced courses as planned. However, some career reservists have also attended these courses. Similarly, the associate basic and advanced courses have been comprised essentially of National Guard and Reserve officers on extended active duty, although some Regular officers have also attended them. A small number of reserve component officers not on extended active duty have attended the associate courses. An even smaller number have been able to attend the regular courses.

The Gerow Plan has been modified many times in the ten years that have passed since its initial adoption. It is important to recognize, however, that no matter how frequently changed or incompletely implemented, this plan constituted the basic blueprint under which the Medical Field Service School began its postwar operations in the field of officer training. Moreover, it still remains the essential blueprint for the progressive education of officers today.

Before we consider the Army Medical Service School's own approach and contribu-

tions to the training problems of today's National Guard and United States Army Reserve, it might be well to review briefly the school's postwar evolution.

After operating for more than 25 years at Carlisle Barracks, the Medical Field Service School was discontinued at that location on February 15, 1946, and moved to Fort Sam Houston, Texas, where larger facilities were available. Upon its arrival at Fort Sam Houston, the School was combined with several other schools; its name was changed to the Army Medical Department Schools; and it became a component unit of the newly created Brooke Army Medical Center.

The Army Medical Department Schools was a short-lived organization. In January 1947, War Department General Orders No. 5 were published providing that:

". . . the Army Medical Department Schools (consisting of the Medical Field Service School, School of Military Neuropsychiatry, and School of Roentgenology) and the Medical Department Technicians School, all located at Brooke Army Medical Center, Fort Sam Houston, Texas, are consolidated and designated as 'The Medical Field Service School.' " The consolidation of the school became effective January 15, 1947.[19]

The overall mission of the School was "to instruct and train Medical Department officers and enlisted personnel in the principles and methods of accomplishing the mission of the Medical Department, to increase their ability as instructors, and to enhance their proficiency in the performance of their future command, staff, and professional duties."

Two of the School's specific missions were particularly significant from the standpoint of future reserve component responsibilities. One required the School to "disseminate to the service in general, information pertaining to the instruction and training used and developed at the Medical Field Service School." The other provided for "a progressive nonresident course of military instruction for personnel of all components of the Army of the United States."

Two departments of the newly reorganized School, both of which had enjoyed brief existences under the earlier Army Medical Department Schools, were assigned special responsibilities in connection with the accomplishment of these specific missions. The Department of Training Doctrine was charged with the assimilation and preparation of new training material formulated at the School for publication. The Department of Extension Courses was charged with the preparation and administration of medical subcourses for all enrolled personnel and the administration of subcourses prepared by other arms and services.

In April 1949, a Civilian Components Section was established in the School Secretary's Office to provide for the preparation, publication, and distribution of training material for the reserve components.[20]

On May 4, 1953, after a series of minor reorganizations, a consolidation of extension courses and civilian component functions resulted in the establishment of the Department of Nonresident Instruction. In August of the same year another consolidation was made. The Department of Nonresident Instruction was combined with the Department of Training Doctrine, and this department assumed responsibility for the accomplishment of all the combined activities.[21] This is the organization today.

With this brief background in organizational evolution, we may now consider more specifically the postwar contributions of the Army Medical Service School to the reserve components.

One primary function of the reorganized school was identical with that performed by the School upon its initial organization in 1921—the formulation of Army Medical Service doctrine based on lessons learned in combat. But in the performance of this function there were several marked differences, created chiefly by the dissimilarity of the two periods.

When the Medical Field Service School first began operations at Carlisle Barracks, there were practically no manuals or other training literature in existence. This meant

that the new school could, in effect, start from "scratch."

The end of World War II presented an entirely different picture, however. The amount of training literature in existence was sizeable and, based on actual experience in combat, most of it was either obsolete or obsolescent. In addition, the tactical and technical problems encountered during the war had added vast new fields for which training doctrine was required. Moreover, the greatly accelerated use of motion picture films, film strips, and other visual aids in training created new areas, which required the preparation of scripts and scenarios. All this created new responsibilities for the School and necessitated that a continuing meticulous review of all training material be maintained to insure conformity with sound and effective training doctrine.

In this assigned responsibility of the School, the Department of Training Doctrine has put forth an unceasing effort. Even as early as November 1946, several months before the Medical Field Service School was formally reorganized and while still part of the Army Medical Department Schools, the department was engaged in effecting the complete revision of five field and training manuals. By the end of January 1947, a few weeks after the present School began operation, the number of projects had increased to thirteen. It has been growing ever since.[22]

Actual work involved in the preparation of these projects varies from the writing of completely new manuals to the careful review of existing or proposed literature to make certain that they comply with the latest formulated doctrine of the Army Medical Service School and the Department of the Army.

The projects include almost every form of training literature published by the Department of the Army—field manuals, technical manuals, pamphlets, training circulars, and technical bulletins. The visual aids with which the School is concerned include film bulletins, professional medical films, training films, film strips, and filmographs.

The work on these projects never ends. Long before the end of the list is reached, the earlier completed projects begin to show signs of obsolescence and must be revised or completely rewritten. This work of the School is of paramount importance to medical units of both the Active Army and the reserve components. Both use the same publications and visual aids in their training and, consequently, both are largely dependent on the Army Medical Service School for the validity of the doctrine which they employ.

No matter how valuable its doctrine contributions, the School has also been of great specific assistance in the training of National Guard and USAR units. By September 1949, six months after the previously mentioned establishment of a Civilian Components section, 42 National Guard subject schedules had been prepared in support of the National Guard medical unit training programs. These schedules, covering a three-year enlistment cycle and providing for progressive individual and unit training, served as a guide for instructors preparing lesson plans and lectures. The project included the printing and distribution of 309,000 copies of the schedules to 1,600 addressees.[23]

By 1950, a medical staff program had been prepared for the training of National Guard and USAR medical battalions and groups. The program was designed to cover a three-year period and provide instruction in staff procedure which embodied the recent war lessons and acquainted officers with current developments. This project comprised 246 hours of instruction and consisted of 140 lessons, averaging twelve pages each.

Later in the same year, 36 training programs were prepared by the School for 165 USAR medical units, again covering a three-year training cycle.[24]

By 1954, the Department of the Army had adopted a new concept—that of providing the same training programs for all components of the Army. Thus, the new training program for mobile army surgical hospitals applied with equal effect to Active Army, National Guard and USAR hospital units, only the time required for completion varying to

meet the time available to each class of unit.

Many of these new training programs have since been prepared by the Army Medical Service School. Currently, the School is engaged in a project which carries this concept still another step forward—the preparation of subject schedules covering the training necessary to provide the many varied specialists required in every type of medical unit. These subject schedules will apply interchangeably to the training of all specialists, whether the trainee is in the Active Army or a member of a reserve component.

From the standpoint of future preparedness, these concepts are of great significance. They mean that henceforth, as the new training programs and subject schedules are placed increasingly into use, it will be possible to measure the status of every Army unit, active or inactive, by a single yardstick in the event of mobilization or deployment. Similarly, the new system affords the School a greater opportunity than ever before to disseminate the doctrine it has so carefully evolved.

One of the postwar training innovations was the establishment of what are now known as United States Army Reserve (USAR) schools. Originally designated as Officer Reserve Corps schools, these schools were intended primarily for the officer who was not a member of a reserve unit and who, either because of quota limitations or personal factors barring his prolonged absence from home, was unable to attend resident courses at Army service schools. Following the successful test of a pilot center in Allentown, Pennsylvania, in 1949, the schools were established in many metropolitan areas throughout the United States. Each consisted of as many branches as there were student groups from the various arms and services that qualified under minimum enrollment criteria.

From a somewhat faltering start, these schools have undergone a considerable evolution. From the beginning each branch of USAR school was dependent on its counterpart service school for training material. However, in the earlier days, service schools often provided such lesson plans and other material as was readily available, without any particular reference to ground covered in resident instruction.

This was the situation when a conference of all Army service school commandants was held at Fort Leavenworth, Kansas, late in 1951, to consider among other problems, the curricula of these schools and the question of the extension of credits to graduates.

Commandants unanimously agreed on the following recommendations:[25]

"That each service school ensure that the courses it provides the ORC schools are filling the needs of the ORC school program and the individuals enrolled in the program"; and, "that constructive credit for resident associate courses not be given at the present time for successful completion of ORC courses."

Much progress has been made since this conference and the adoption of the recommendations quoted above. At the present time, branches of USAR schools are closely patterned after their resident counterparts. USAR school medical branches offer courses in both company and advanced phases which are paralled to those conducted by the Army Medical Service School in residence. Enrollees in both USAR school courses are offered 384 hours of instruction, requiring three years to complete. Of this total, 144 hours are provided through 24 paid drills each year, each of two hours' duration. The remaining 240 hours are gained by attendance at 3 annual 15-day active duty tours.

With this training time available, it is possible to base instruction on actual plans of instruction used in resident courses. In most cases, identical lesson plans, student handouts, examinations, and similar instructional overlays, viewgraphs, and other training aids employed by Army Medical Service School instructors are used.

With medical branch enrollment now approximating 1,000 students and an enrollment of over 1,100 forecast for the school year beginning September 1, 1956, the

USAR schools have become big business as far as the Army Medical Service School is concerned. For example, during the 1955-56 school year approximately 151,000 units of material were shipped for use in USAR schools. Requirements forecast for the next school year include such items as 8,100 conventional maps; 900 aerial maps; 4,000 sketch maps; 12,200 overlays; 6,300 viewgraphs; and 145,900 8 by 10 inch charts for use in lieu of viewgraphs. Thus, although the schools themselves are administered by the military districts in which they are located, almost all of the requirements of the medical branches, other than for Department of the Army publications which are available in the reserve center library, are filled by Army Medical Service School.

In March 1956, there were 92 medical branches of USAR schools, distributed throughout every section of the country, including one in Hawaii. Branches are usually small, averaging about ten students, with two instructors who, like their students, are reserve officers. Each instructor is authorized an additional 24 paid drills per year for preparation of his material. The typical medical branch consists of a single group taking a specific year of one of the two courses. Thus, during the 1955-56 school year, the branch in Miami, Florida, was comprised of officers enrolled in the second year of the advanced phase. More exceptional was the medical branch at Oklahoma City, which included third-year students in both company and advanced phases. Normally, a new group is not formed until the existing group completes its third year and graduates.

All of this reflects the tremendous progress that has taken place since the 1951 commandants' conference. Even more significant, however, is the fact that for all practical purposes these 92 branches now constitute genuine branches of the Army Medical Service School. This year, for the first time, USAR school medical enrollees who complete their final year on August 31 will receive actual Army Medical Service School diplomas, similar to those received by graduates of the resident associate courses.

The implications of all this are very clear. With the help of the Army Medical Service School, the medical branches of USAR schools have now come of age and are contributing substantially toward meeting one of the major objectives of the Gerow Board —that of providing a high quality, standardized form of progressive individual training for Reserve officers.

Successful as the USAR schools have been, they were never intended to provide progressive training for *all* reserve component officers unable to attend resident courses. Neither National Guard officers nor the great majority of USAR officers with unit assignments have been able to attend USAR schools. In addition, the absence of a school or the lack of a sufficient number of officers with the same military educational level from the same branch of service bars enrollments in many communities.

So, for another solution to the problem of individual training, we must turn again to an old friend—the Army extension course.

The School, as in the formulation of new doctrine, put a high priority on the job of revitalizing the extension courses and getting them underway. The resultant effort proved highly profitable for by the end of 1947 almost 2,000 Army Medical Service officers and enlisted men were again studying by correspondence.

Superficially, the postwar system bore a close resemblance to the one in existence at the time the extension courses were discontinued to make way for World War II.

In both systems, the courses were divided into six classifications: the 10-series for precommission basic military instruction; 20-series for second lieutenants; 30-series for first lieutenants; 40-series for captains; 50-series for majors and above; and a 60-series for senior officers, which was administered by the Command and General Staff College. Perhaps the only difference in the

superficial organization of the prewar and postwar courses was the recent addition of a special course on hospital administration.

There were several fundamental differences between the old and new extension course systems, however. One difference was administrative. Both prewar and postwar courses were written by the School, except where the subjects made it profitable to obtain the material from other service schools. Prewar courses, however, were administered by the corps areas with enrollments processed by area headquarters and actual marking of subcourse lessons accomplished by medical officers on detached duty with the organized reserves or National Guard. Postwar courses have been completely administered by the Army Medical Service School, permitting greater uniformity in grading lessons and examinations, and, of greater importance, increased facility for replacing outdated material that might otherwise mislead the student. The addition of retirement points has added another responsibility to the School. Prior to World War II, retirement was a monopoly of the Regular establishment. The recent provision for the retirement of reserves who have achieved prescribed standards of activity in their service includes an allowance of one retirement point for every three hours of extension course activity. The School computes the retirement points of each reservist student annually and advises his military district.

Perhaps more impressive than the administrative changes are the striking differences in scope between prewar and postwar extension courses. The differences in both number of subcourses and hours of instruction for the 30-, 40-, and 50-series, which were the prime prewar responsibility of the Medical Field Service School, are tabulated below.

	1941-42[26]		*1955-56*[27]	
	Subcourses	*Hours*	*Subcourses*	*Hours*
30-series	22	429	40	532
40-series	11	139	50	873
50-series	5	105	10	145
	38	673	100	1,550

Since the publication of the 1955-56 extension course catalogue, the scope of the current program has been further expanded by the addition of 16 subcourses and 319 hours of instruction to the 50-series course. As a result, the total number of subcourses and hours has almost tripled during this period.

The current Army Medical Service Extension course program includes a total of 138 different subcourses. Of these, 70 required and five optional subcourses have been prepared by the School, with the remainder comprising subcourses prepared by other service schools.

Enrollment at present is somewhat less than the total figure previously cited for 1937. The decrease is partially due to the increased amount of time required to complete a course today because of additional subcourses and hours, and, partially because of paid drills, USAR schools, and other training activities now available to the reservist. Any comparison of enrollment figures is also somewhat affected by the number of reservists on extended active duty with the Active Army.

Enrollment for the quarter ending June 30, 1956, included:[28]

	10-series	*Other series*	*Total*
United States Army Reserve	862	2,498	3,360
National Guard	1,970	1,044	3,014
Active Army	2,139	1,405	3,544
	4,971	4,947	9,918

Mere enrollment figures, however, hardly reflect a true index of the School's extension course activity. During the fiscal year ending June 30, 1956, for example, the School had processed 3,390 new enrollments in extension courses. Almost 14,000 subcourses were completed by enrollees, which, in turn, required the grading of 106,797 lessons. A total of 30,000 subcourses were shipped during the year to new students or those completing other subcourses.

It therefore becomes evident that the School has made a significant contribution to the training of both reserve component

officers and enlisted men through its extension courses.

In spite of this record, when considered in the light of the Gerow Board recommendations and the ultimate in training interchangeability, the present extension course system has one defect. The present scope of extension course subjects has been vastly expanded and includes those items with which an Army Medical Service officer should be familiar. Neither the subjects nor the hours allotted to them, however, are directly related to the resident company and advanced courses given at Army Medical Service School. In this regard, they differ from the USAR school system.

This problem was considered by the then commandant of the Medical Field Service School when he met with other school commandants at the Fort Leavenworth conference in 1951 previously alluded to in the USAR schools discussion. The specific problem was "to determine what, if any, award of constructive credit for service school resident courses should be made upon successful completion of appropriate extension courses. . . ."

The recommendations, unanimously agreed to by all commandants, were:

"That the commandant of each service school investigate his extension course and associate resident course programs to determine the basis upon which constructive credit for associate resident instruction may be given"; and "that recommendation by Office, Chief of Army Field Forces be made to Department of the Army requesting establishment of a policy to permit granting of constructive credits determined above."

Since 1951, considerable study has been given to this problem. Out of this study has come the plan for a dramatic reorganization of the extension course program, which will be partially placed in effect in the near future.[29] The new concept divides the extension program into five courses:

1. An *Army precommission extension course,* which will cover basic military subjects common to all branches of the Army required for reserve component appointment in the grade of second lieutenant. This course will be administered by the Infantry School.

2. A *company officer extension course,* paralleling as closely as practicable the resident associate company officer course of the Army Medical Service School.

3. An *advanced extension course,* paralleling the resident associate advanced course of the School.

4. A *staff extension course,* paralleling the resident associate staff course of the Command and General Staff College and administered by that school.

5. *Special extension courses,* including all other courses. The present hospital administration courses will continue in this category.

As far as the Army Medical Service School is concerned, it is believed that with a brief period of active duty at the School to cover those subjects which obviously cannot be taught by correspondence, it should be possible to evolve a program whereby, as is now the case in the USAR schools, an officer can gain an actual School diploma, essentially through correspondence.

However, a great deal of work remains before this program can be completely implemented. A careful check of the scope and time allocation of present extension courses against their resident counterparts must be made. Existing subcourses must be reviewed and, where necessary, revised or new ones prepared to meet resident requirements.

From the standpoint of the School, the additional work is well worthwhile. If actual resident credit can be given for extension course work, then the project of assuring that all officers have the equivalent of the company officer or advanced courses as originally envisioned by the Gerow Board will be given a powerful boost. And, best of all, perhaps the two systems for nonresident instructions—that is, USAR schools and Army extension courses—will overcome the two obstacles poised by Major Ashford in his early Wellcome essay and achieve the objectives of resident training with minimum

disturbance to the reservist's civilian career and minimum expense to the government.

This concludes our discussion of the Army Medical Service School's contribution to the training and preparedness of the reserve components. From this discussion, no matter how incomplete, it should be evident that these contributions extending from the School's inception, have been of such magnitude that not only the School staff, but the Army Medical Service as a whole, can take justifiable pride in their accomplishment. In its 36 years of operation, the Army Medical Service School has demonstrated not only a genuine concern for the discharge of its reserve component responsibilities but also the priceless ability to change its methods and techniques to meet changing situations.

This does not mean, of course, that the School has solved the basic problems of reserve organization, operation, and utilization. Important as training is, it comprises but one portion of a complex group of factors which in the final analysis determine the true effectiveness of our national defense. Some of these factors are dependent on national policy, others on regulations and procedures established by the Departments of Defense and Army, and still others on such ill-defined considerations as international relations and the status of national morale and patriotism.

The ultimate in reserve preparedness would be a citizen force ready for mobilization at a moment's notice—completely prepared for combat. We may realistically question whether we will ever reach a goal of such perfection and, at the same time, warmly welcome all signs of progress toward its attainment.

Today there are many signs of progress. These include such diverse considerations as the passage of the Reserve Forces Act of 1955, the continuing growth of the National Guard, and other factors enumerated in this discussion.

This progress is of utmost importance to the Army Medical Service as it envisions its responsibilities in the event of a global war in a nuclear age. It is important also to the Army Medical Service School, for the School's contribution can be infinitely greater with a reserve properly organized, manned and motivated. Thus, the encouraging signs of today point to even greater opportunities for service by the School to the reserves of tomorrow.

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WOMEN MEMBERS TO HAVE IMPORTANT ROLE IN THE CONVENTION

Colonel Inez Haynes, Chief of the Army Nurse Corps, has been named Chairman of the Registration and Reception Committee for our 1957 Convention to be held at the Hotel Statler, October 28, 29, and 30.

Other members of the committee are: Captain Edith Jones of the National Institutes of Health; Lt. Col. Ethel Kovak, Office of the Surgeon General, Air Force; and Mrs. Marian Wood, Nurse Personnel Standard Specialist, Veterans Administration. There is one male member of this committee: Major Arthur E. Hoeg, Jr., MSC, Office of the Surgeon General of the Army.

What the Hospital Administrator Should Know About Stock Control

By
MAJOR GROVER C. KISTLER, MSC, *U. S. Army**
AND
MAJOR W. R. MCKIM, MSC, *U. S. Army*†

(With five illustrations)

STOCK control is the process by which through a system of records and reports pertinent data are maintained on the quantity, the location, and the condition of supplies due in, due out, and on hand.

The stock control function of a medical supply officer, who is an accountable property officer, is accomplished through the use of two tools—the locator system and the stock record account.

The locator system is just what the term implies. It is a system established in the bulk storage area (warehouses) of the supply which identifies the specific location of stored items. Bulk stocks are stored according to available space and not according to stock numbers. In order for a locator to work properly, it is necessary that warehouses be assigned significant location numbers; for example, 324-112-123. The first group of three digits identifies the warehouse number and the floor, the first two digits indicate the building number and the third digit indicates the floor number; the second group indicates the row location; in the third group, the first two numbers show the stack or the specific crosswise location on a row and the last number shows the level on which the specific item or pallet will be found.[1]

A locator system consists of a file of stock locator cards with one card for each item stocked. A suggested format of the stock locator card is given in *Technical Manual 743-200,* Storage and Materials Handling, a joint publication of the Army, Navy, Air Force, and Marine Corps.

Items not stored in bulk are stored in bin areas with appropriate notation on the locator card and with placards or signs on the bins which indicate the class of items and vertical locations.

Let us now turn to the stock record account of the medical supply officer. The stock record account is a formal record showing by item the receipt, the disposition, the available balances on hand, and certain identifying and control data.

As a general rule, there is only one accountable officer for the supplies stored and issued by a technical service; for example, there is only one installation medical supply officer, only one installation quartermaster supply officer, etc.

In the case of the medical supply officer, he will generally have and will operate two stock record accounts. One of the accounts will record all serviceable property and the other will record all unserviceable property. Stock record accounts may be maintained manually or with the use of electric accounting machines.

Each stock record account is assigned a particular identifying number which is controlled by the army commander and assigned upon the request of a chief of technical service or post commander. This number is placed on all requisitions, receiving reports, and purchase orders.

A stock record account consists of the following elements:

1. *Voucher Register.* This is nothing more than a numerical key which controls the

* Instructor in Hospital Administration, Department of Administration, Army Medical Service School, Brooke Army Medical Center, Fort Sam Houston, Texas.

† Instructor in Supply Principles and Procedures, Department of Administration, Army Medical Service School, Brooke Army Medical Center, Fort Sam Houston, Texas.

documents passing through the supply. It lists all documents (vouchers) covering actions which affect the status of supplies.

2. *Voucher File.* This is a file of documents which are assigned a voucher number from the voucher register and evidence a supply transaction. There are three types of vouchers:

(a) Debit voucher. This document lists articles to be picked up so as to increase a balance on hand. For example, a turn-in from a using agency or a receipt of supplies from a depot.

(b) Credit voucher. This document lists articles to be dropped from the account so as to decrease a balance on hand. The best and most common example of this type of voucher is the request for supplies submitted on an issue slip or similar document.

(c) Adjustment voucher. This document is used to adjust the recorded balance on hand so as to bring it into agreement with the actual physical inventory of stocks by increases or decreases, as appropriate. This type voucher is also used to adjust stock number and make item identification changes.

3. *Stock Record.* The stock record, under a manual system of supply accounting, consists of the following elements which are filed in a visible file.

Stock accounting record. This is an accounting form on which are recorded the transactions affecting the status of a recorded item. See Illustration 1.

Title insert. This is a removable form supplied by the distribution depot which provides item description data for a particular item. The title insert is filed with the stock accounting record and is provided with a sliding celluloid signal to aid in the stock control task. See Illustration 2.

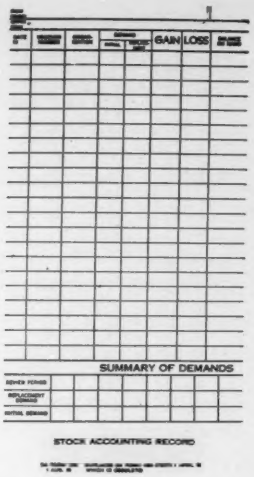


ILLUSTRATION No. 1

Due in card. This card is used to record anticipated receipts when not recorded on the demand data card; i.e., for special and emergency requisitions and for local procurements not on cycle. See Illustration 3.

Due out card. This card is used to record obligations to consumers of items not immediately available when requested. See Illustration 4.

Demand data card. This card is an electric accounting machine card on which is recorded information for computing the requisitioning objective (supply level), determining requirements or excesses, and recording due-in and follow-up action on replenishment (cycle) requisitions and excess reports. When this card is filled in it may be transmitted to the distribution depot upon call where it can be used in special supply studies and computations. See Illustration 5.

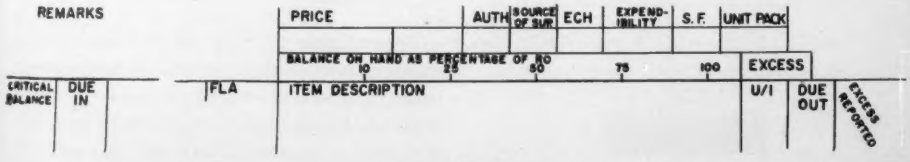


ILLUSTRATION No. 2

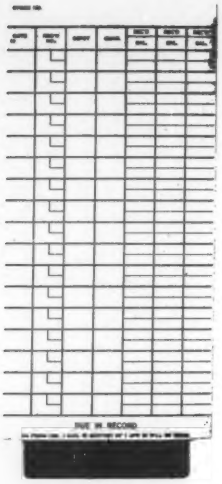


ILLUSTRATION No. 3

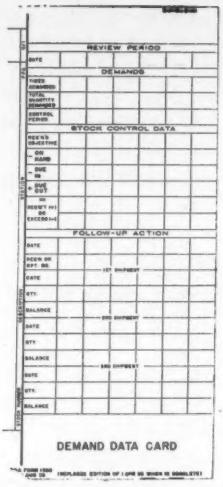


ILLUSTRATION No. 5

There are six major steps in the accomplishment of the stock control function which are of importance to a hospital administrator:

1. *Requisitioning and Receiving Supplies from Depots.*

The most important element of stock control is the determination by the medical supply officer of realistic requisitioning objectives (R/O). It is upon this factor that all requests for supply to a depot are based.

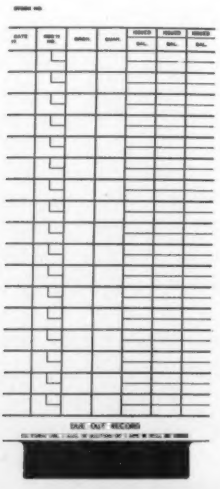


ILLUSTRATION No. 4

The requisitioning objective represents the quantity of matériel to be on hand and on order to sustain an activity for a period of days as established by the Department of the Army.

In establishing a requisitioning objective, the replacement demands of consumers for at least 180 days are used as a basis for establishing an average consumption factor.

The medical supply officer can determine the requisitioning objective in a number of ways utilizing data from his stock record; for example:

$$R/O = \text{Demand accumulated over a given number of days} \times \frac{\text{R/O in days}}{\text{Number of days in which demand was accumulated}}$$

$$R/O = \frac{\text{Demand}}{\text{Number of days in which demand was accumulated}} \times \text{R/O in days}$$

Based upon the computed requisitioning objective for each item and in accordance with distribution depot schedules, requisitions are prepared to bring the total on hand, less matériel already due in and plus matériel due out, up to the requisitioning objective.

Several weeks before a depot shipment arrives at a hospital, the medical supply officer receives an action copy of his requisition from the depot. This is a most important document since certain items may be placed on due out at the depot, cancelled for some reason, authorized for local purchase or reported to the supply control point for further supply action. All of these situations require additional administrative action by the supply officer if he is to properly serve his consumers.

The actual shipment of stock to a hospital from a depot results in a transfer of property accountability from the depot to the medical supply officer.

From the hospital administrator's standpoint there are certain areas that must be reviewed to assure proper performance of this function:

That requisitions on depots are prepared and submitted in accordance with depot instructions.

That the conditions under which emergency and special requisitions to depots may be submitted are clearly understood by all concerned and that instructions from depots in this area are closely followed.

That the stocks received by the medical supply officer are inspected and counted by the receiving personnel. In other words, be aware that stocks must be thoroughly checked at time of receipt to avoid subsequent unnecessary adjustment to recorded quantities.

2. *Issuing Supplies to Consumers.*

Some document must be used to obtain supplies whether it is an issue slip, a punch card, a preprinted list, etc.

The issue document serves primarily as a request for supplies; however, it also serves as an accounting document and as a notice of supply action to the consumer.

When supplies are issued by the medical supply officer he terminates formal accountability and the requestor assumes informal accountability and records all nonexpendable items in a property book.

In the issue process, there are certain points of interest to the hospital administrator. He should be aware that:

Regulations require that the medical supply officer establish a schedule for issuing supplies to consumers and that these schedules be coordinated with depot requisitioning schedules to the end that all local requests are received prior to submission of depot requisitions so that the most current stock situation is considered at this time.

Consumer or using agency levels of supply must be established and maintained to facilitate ordering, reduce emergency requests, and assure proper stockage.

Supplies of the Army Medical Service are not issued for use in quarters except for the treatment of sick or injured personnel. In these cases the hospital commander must give his written approval.

3. *Dues-out.*

The medical supply officer is responsible for obtaining and having available the supplies requested by a consumer.

Due to the many changing situations that transpire at hospitals which affect stockage, there are instances where the medical supply officer may not have an item that is desired immediately available for issue. In these cases, a due-out is established.

The establishment of a due-out is a recording of a future commitment for issue of a specified quantity to a consumer.

When the items held as due-out have been received from a source of supply, the medical supply officer must immediately handle the administrative details and issue the supplies.

Again from the hospital administrator's standpoint there are certain points of concern:

Dues-out should be screened by the consumer and medical supply officer every 30 days to determine if any action can be taken to expedite supply or cancel items for which requirements no longer exist.

Due-out items must be issued as received and not held until all the due-out items as originally established have been received.

Frequently dues-out are the direct result of using agencies ordering an excessive

quantity which misses being screened in the supply and is issued. For a period of time no additional demands are made, the medical supply officer routinely, in accordance with regulations, reduces his requisitioning objective because of lack of demands—then, in comes a bona fide request which because of the previous large issue can only be partially filled and then we find "crash" procurement or emergency requisitioning action. The hospital administrator can reduce considerably this situation by requiring frequent inspections of supply closets and the establishment and maintenance of using agency levels.

4. *Turn-In.*

The turn-in process is the method wherein a using agency divests itself of supplies no longer needed or which are no longer satisfactory for their designed purpose.

Normally, supplies are segregated and classified as to serviceability by personnel of the using agency when turned in: This classification is translated into an appropriate serviceability remark which is indicated on the turn-in document.

Just as issues are scheduled, it is frequently advantageous to schedule turn-ins in order to make the most effective use of pick-up service.

As an aid in the supply economy program, hospital administrators have found in certain situations, that it is advantageous to have remnants of supplies turned in before additional stocks are issued. While this must be tempered with common sense, it must be recognized that there are many items that lend themselves to such a control; for example, light bulbs, batteries, minor instruments, and thermometers, to cite a few.

From the hospital administrator's standpoint the objective in the turn-in process is accurate and complete terminology of items turned in; segregation of items and documents by technical service; classification as to serviceability by the user and most important, the determination as to the cause of unserviceability and where indicated, the assessing of pecuniary liability.

5. *Adjustments.*

Very few supply accounting and storage functions, whether they be civilian enterprises or their military counterparts, can be operated at 100% accuracy at all times.

Recognizing that there will be gains and losses of supplies as a result of operations, the Department of the Army has established a number of methods whereby relief from responsibility and for accountability can be achieved.

These methods are used not only in the adjustment of the account of the medical supply officer, but, under certain circumstances the property books of responsible officers.

The forms most frequently utilized are the inventory adjustment report, the report of survey, the quarterly report of operational loss and/or breakage, the schedule of collections, and the statement of charges.

In all of these adjustment processes, the hospital administrator should be aware that any adjustment may be an indicator of a potential problem area which must be investigated before the area develops into an actual problem. For example, frequent or large inventory adjustment reports may point up careless posting operations; improper stock selection indicating a need for training or improved warehousing; inadequate security measures; etc. A large number of reports of survey, schedules of collections and statements of charges may be an indication that department and division heads need to take steps to prevent misuse and improper handling of supplies through better indoctrination and control.

6. *Recording Demand Data.*

Demand is the approved quantity of an item that has been requested—not what was issued, not what was substituted but what the using agency requires based on sound experience.

Recording demand data is a most essential element required by the medical supply officer to calculate his requisitioning objective for a particular item.

It is important that the hospital administrator assure that there is published for the

guidance of all using agencies the definition of, and differentiation between, replacement and initial demands and that supply requests are appropriately indicated.

In order to have the demand picture reflected as smoothly as possible, supply requests should be submitted at scheduled intervals and be based on sound consumer levels.

Under the manual system of supply accounting, demands from consumers are recorded on a demand data card. (See Illustration 5.) Two of these cards are furnished the medical supply officer by the distribution depot, and as a card is forwarded to the depot, a new card is automatically provided as a replacement.

As previously indicated, the medical supply officer, based on demands of his consumers, with consideration to future workload, can compute the requirements or excess for all items stocked for hospital use.

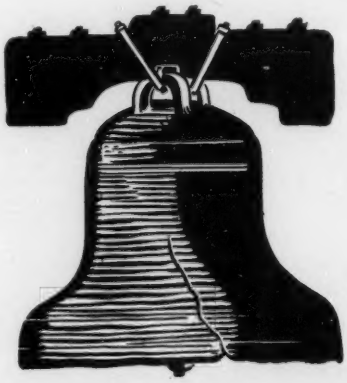
With an understanding of the stock control process and the employment of checks at certain strategic points in the process, the hospital administrator can be assured of the right amount of stock at the right time at the right places with a minimum of adjustments and a maximum of control all aimed at improving patient care.

REFERENCE

[1] TM 743-200, Storage and Materials Handling, June 1955, pp. 24-2, 24-3.

We have reached a reflective plateau; a point where we are beginning to scrutinize pricetags.

Quote, Moving Finger



EDITORIAL

International Geophysical Year

AFTER the years' long advent, the International Geophysical Year is finally with us. Its mysterious initials, the "I G Y," are already familiar to the whole English-speaking world. We may also know that this so-called "year" of geophysics will not be a year at all, but a longer period of time which just began on the first day of July 1957, and will stretch out to the last day of December 1958.

During this 18-months period we shall become witnesses to the greatest cooperative scientific venture of Mankind. About 56 nations and more than five thousand of their scholars are going to participate in the project which, by the International Council of Scientific Unions and its special Committee established in 1951, has been carefully planned several years in advance.

With the intellectual and financial power of such a world-wide organization, the efforts of the selected investigators are to be concentrated upon Man's Environment, upon the physical study of the ground whereon we stand, of the waters which surround us, and of the air which blows around us and forms a coat of protection to keep us separate from the rest of the Universe.

Our own national share in this ambitious enterprise was organized by a Committee of the National Academy of Sciences. Headed by a recognized geo-astrophysicist of California, this committee then set up thirteen technical panels, each to be concerned with a major area of geophysics or with some special means of research. None of these panels is however medical.

The present I G Y is the third generation in a family of global research years. The two earlier cooperative enterprises in this family were called "International polar years." Though at a smaller scale, and in a narrower theater of operations, they were of great importance to science. The first one of them came about by an action of the International Meterological Committee which in 1879 appointed a special commission to organize temporary observations for one year in the north-polar region. Thus, the first International Polar Year opened 75 years ago in 1882, and it stretched out into 1883. Fifty years later a second International Polar Year was organized, and during its course, in 1932-1933, many valuable observations were made.

In the present enterprise of the I G Y, the entire globe is going to change into a huge experimental laboratory. There are numerous questions in search of answers which are expected to be obtained in the huge laboratory from observations that can be made during such special periods of research only. We are, for instance, still puzzled by such questions as whether the Earth's atmosphere which keeps us alive could be ever lost in space; whether we could forecast and prevent arid spells in our climate; how the Antarctic is influencing the climate of the peopled regions of the world; in which manner solar activity, terrestrial magnetism and aurora borealis are correlated; whether we could detect the source of rewarming of our climate, the cause of the continued yearly increase in global temperature which accurate instruments have been recording for the past 50 years, etc.

One of the most important objectives of the I G Y research is to detect the origin of the cosmic rays. These particulate radiations are coming from the outer space, at the rate of about one particle a minute per square centimeter of atmosphere. Many of the particles are absorbed by the air; many reach the surface of the Earth; they even are penetrat-

ing into great depths and are detectable in subterranean mines under many layers of rock. The cosmic rays abound in heavy electrons (baritrons). It is hoped that the "rockoons" and the various observation posts, set up at high altitudes and at the polar regions, will solve the problematic source of these rays. (The "rockoons" are balloon-borne rockets, sent up very high, to 60 miles, into the atmosphere during cosmic-ray determinations.)

To many people, the International Geophysical Year chiefly means the year of launching the various terrestrial satellites. The Lockhead Aircraft Corporation was going to send up its "MOUSE," a 30-day satellite. The U.S. Government will attempt to launch its "moon," the VANGUARD, a trial which represents a great advance in "very high altitude research." This satellite is a sphere of about 20 inches in diameter, weighing 21½ lb., together with the instruments it will carry. It is of magnesium, outerly coated with aluminum and silicium monoxide, to withstand the changes of weather. The artificial "moon" will be carried by a three-stage finless rocket vehicle, 70 ft. in length and weighing some 22,000 lb. The third portion of the rocket is expected to push the speed of the satellite to 18,000 miles per hour. It will be launched from the Patrick Air Force Base, Cocoa, Fla. Several tracking stations have been set up to follow the course of the satellite in its elliptical orbit, and to acquire data from it by optical and radio devices. In addition to the existing posts for geophysical studies, new tracking stations were established at the Arctic and Antarctic, around the Equator, along the meridians 10° East (in Europe and Africa), 140° East (in East Asia and Australia), and 75°-80° West (in North and South America.)

The nearest point (the perigee) of the spheric satellite's course is expected to be 200 miles, and the farthest (the apogee) about 800 miles out. The Vanguard is planned to finish a full revolution every 90 minutes. Ultimately, as its speed will decrease, the sphere will descend into thicker parts of the atmosphere, to die the fiery death of flaming meteors arriving to us from the outerspace. Six earnest attempts will be made to launch terrestrial satellites during the period of I G Y.

Many government agencies, including the Department of Defense, are participating in some phase of the huge program of the I G Y which today represents a vast national organization, costing the U.S. taxpayers some 40 million dollars. The Army Signal Corps, for instance, through contracts with universities and others, is taking part in the study of aurora and airglow, and of the cosmic rays, the launching of the satellites, in the research in glaciology, ionospheric physics, longitude-latitude studies, meterology, rocketry, and in the project of world days and communication. The Vanguard project is in the hands of the Office of Naval Research and of the Naval Research Laboratory.

It is unfortunate, of course, that the chance of an active participation of the biomedical sciences in this grandiose venture has been completely unrecognized by the organizers of this global enterprise. Isn't Man the most important part of Earth and of the Universe? And the ground and the sea and the air, with its constantly changing weather, and all the mysterious geophysical forces—aren't they but His Coat and environment, His Biosphere upon which His well-being, His health and His health's variations into sickness have been always dependent? In this modern era, nobody can doubt anymore that the knowledge and exploration of the activities of the Sun, of the Waters, of terrestrial magnetism, of the gravitational forces, of cosmic rays, etc., are of much greater importance to Man as the factors of His Life than their knowledge and exploration as mere geophysical or astrophysical forces.

Thus, global studies of the structure and the motions of the atmosphere by a team of geomedically minded physician investigators would have been of immense value for the better understanding and prevention of respiratory diseases and certain allergic affections. Teams of biologists should have had place and opportunity during the I G Y to

concentrate their efforts upon the genetic and pathological effects of cosmic rays, the production of mutations by cosmic radiation, and the exact role these rays, travelling perhaps for eons of light-years, are (and have been) playing in the origin, further evolution, and maintenance of Life on our Globe of Mud. Our knowledge of the biomagnetic forces and of nuclear medicine would be also greatly enlarged by having put medical members in the teams of research workers who are going to study terrestrial magnetism and to use rockets for the exploration of solar x-rays, etc.

While each segment of its program is of unquestionably great value for the physical and the military sciences, the International Geophysical Year, and many of the discoveries during this period of scientific earnestness, may yet provide sufficient useful data, even though of an indirect nature, to the medical and biological sciences. Advancement in one field usually helps progress in other fields, too, and we hope with Thomson, the physicist, that "a great discovery is not a terminus, but an avenue leading to regions hitherto unknown. We climb to the top of the peak and find that it reveals to us another higher than any we have yet seen," another, almost beyond the frontiers of the mind.

PROPOSED CHANGES TO BY-LAWS OF THE ASSOCIATION

The Executive Council of the Association of Military Surgeons proposes certain changes in the By-Laws of the Association. These changes will be voted on at the Business Meeting of the Association to be held during the 64th Annual Convention, Hotel Statler, Washington, D.C., October 28-30, 1957.

CHANGE 1

Paragraph 5, Article VI, Section 3.

Present reading: "The accounts of the Secretary shall be audited by *an officer of the Finance Department of the Army or of the Bureau of Supplies and Accounts of the Navy, or* a certified public accountant as soon as possible after the end of the fiscal year (*September 30*) and at such other times as the Executive Council may require."

Proposed reading: The accounts of the Secretary shall be audited by a certified public accountant as soon as possible after the end of the fiscal year (June 30) or at such other times as the Executive Council may require.

CHANGE 2

Last sentence, Article XII, Section 6. (Retirement Plan Fund) "The fund may be invested by the Board of Trustees in *United States* Government Bonds *or in such other securities or deposits as are insured or guaranteed as to principal by the United States Government or a Government-owned Corporation, and yield a maximum interest rate consistent with reasonable safety and convertibility for payments,* or deposited in a bank or trust company until so invested or until used for the purposes of said fund." (The proposed amendment consists solely of the addition of the words in italics above.)

HONORARY MEMBERSHIP

LIEUTENANT GENERAL SIR ALEXANDER DRUMMOND, Director General, Army Medical Services, Great Britain, was presented with the certificate of Honorary Membership in the Association of Military Surgeons of the United States and the badge of the Association, by its president, Colonel Amos R. Koontz, Medical Corps, National Guard of Maryland, May 16. The presentation was made following an address* which General Drummond made at the Sternberg Auditorium, Walter Reed Army Medical Center, Washington, D.C.

Courtesy of Dr. Arthur Turner

(Left to Right): COL. AMOS R. KOONTZ, MC, NG, Md.; LT. GEN. SIR ALEXANDER DRUMMOND; MAJ. GEN. SILAS B. HAYS, MC, USA.

Just prior to the presentation of Honorary Membership, Major General Silas B. Hays, Surgeon General of the United States Army presented General Drummond with a certificate designating him Honorary Consultant to the Surgeon General.

General Drummond had visited a number of Army installations and had interviews with various officials of the Office of the Surgeon General during which he was briefed on the policies, programs and activities of personnel, professional training, hospital administration and other topics of joint interest to the Army medical services of both nations.

* To be published in MILITARY MEDICINE.

Around the World

(Ser. II, No. 11)

By

CLAUDIUS F. MAYER, M.D.

KAGAWA and *Kochi* are two prefectures in Japan where a new type of rickettsial disease has been observed in recent years. The infectious ailment, known under the local names of *"umayado disease"* and *"hoppan disease,"* is a variant of the scrub typhus, and it occurs exclusively during the summer when it causes a number of deaths. The disease, which is also called the Shikoku type of tsutsugamushi, is transmitted by the mite *Trombicula tosi.* The infection starts suddenly, with fever lasting 15 days, and with a skin rash all over the body. There is the well-known "eschar" mark at the site of the insect's bite. Doctors in Kagawa also know of a winter form of the scrub typhus, almost never fatal, which first appeared in 1955 in the town of Tsuda-cho.

Having become the accidental birthplace of the atomic age, Japan continues to be interested in nuclear physics and radiobiology. The late effects of the *atomic bomb injuries in Hiroshima* and Nagasaki are still in the front line of Japanese medical research. Concerning these injuries, a doctor of the Nagoya University could trace about 2,582 persons who had witnessed the bombing more or less close to the epicenter. Of these people, 220 were studied in detail. Soon after the exposure to the gamma rays, 34 became bald; some 44 were burnt; 54 had other injuries; 53 developed fever; 15 had sore throat; 54 began to vomit; 42 showed tendency to bleeding, and 6 complained of irregular menstruation. Ten years afterwards, only 54 were completely free of complaints. Many complained of weariness, and neuralgic pains. Their blood gave a picture of hyperchromic anemia, increased number of white blood cells, and shortage in blood platelets, which is typical for the type of radiation anemia we may sometimes find in x-ray technicians.

Japanese physicians follow with alarm the experimental bombings being conducted by the great powers many miles away but close enough to shower some subjects of Nippon with dangerous particles. At some universities (such as Tokushima), stations have been established for the daily *measurement of the radioactive precipitation.* At others (Yokohama), the main interest of nuclear medical research is in the prevention and *treatment of radiation injuries.* Indeed, there was found a long series of substances (for instance, purified vaccine lymph, given subcutaneously) which do wonders, at least in animals exposed to radiation.

The dangers of radiation are now openly discussed at various public forums, including the assemblies of legislative bodies. Thus, several members of the British Parliament urged the Prime Minister recently to take the initiative in halting further *tests with the hydrogen bomb.* It was pointed out that new evidence indicated that the radioactive particles (Sr^{90}, and others), released by the explosions, had reached a dangerously high level in the Earth's atmosphere or biosphere. There seems to be, however, some disagreement about this between the British Government and the British medical profession at large. The Prime Minister is relying upon the data supplied him by the Medical Research Council, while the doctors state that the data of that Council are now obsolete. Undoubtedly, it is in nobody's interest to either under- or overestimate the *hazards, genetical and individual,* of the nuclear explosions—according to the opinion of one of the foremost British authorities in this field (Prof. Haddow).

Plans were announced for the erection of a *New Guinea Central Medical School* in Port Moresby in 1957. The school will be built at Taurama, 4 miles from Moresby, in the neighborhood of the Native Hospital. It will train native students in some special fields some of which work is now carried out in the Suva Central Medical School. The

great difficulty is that the language of teaching must be English. Since the population of Papua-New Guinea (1,700,000) is growing alarmingly, and it is expected to reach 4½ million by 1980, anything is welcome to improve the health services. Fifty percent of the territory's medical services is made up by 36 migrant doctors who have foreign medical degrees which are not recognized by the Australian-British Medical Association. These doctors are selected for the Service by the Director of Health. Many of them were specialists in their own countries.

The *Papuan Health Service* has also the cadet system whereby it pays the fees of selected medical students from the third year on plus a salary. The students, when qualified, must serve a specific period in the Territory. There are now 74 doctors in practice in the Papua-New Guinea Territory, five of them working with church missions. A typical *mission hospital* is the one *in Mandang,* New Guinea. This institution, the Yagaum Hospital, is maintained by the Lutheran Church of Australia. It is open to white, native and Chinese patients who come as in-patients and out-patients. It has wards for 25 Europeans, and 400 natives. The annual admissions reach 3,500, and the same number are treated in the outpatient wards. The hospital serves also as a training center for medical aidmen and nurses.

Last December, the weather was very bad *over Christmas Island* in the Pacific when a doctor's wife there happened to give birth to her baby. A complication developed, and the mother was bleeding dangerously. A call for help through the radio was answered by a brave British flight surgeon, stationed near Singapore, who made a *parachute landing* with great courage and determination in the adverse weather conditions. He justly deserved the Air Force Cross which was recently given to him as an award for his services.

Since the announcement of the plans of their socialistic government, French physicians are in a quandary. The plan, known also as the *"Gazier Project,"* intends to introduce a form of State medicine and wishes to regulate officially the *system of medical fees.* Many protests have been raised against such interference with medical practice. Even the great daily papers, *Le Figaro* and *Le Monde,* considered the topic of such importance that they opened a discussion on the question: "Can the medical performance be price-listed?" (*"L'acte médical est-il tarifable?"*). Should a doctor hang out a schedule of his fees in his office as the tonsorial artist in the barbership? According to the great majority of French physicians, such a general price schedule is against the French Code of Medical Ethics (which had been revised and reissued just about a year ago). Demoralization of the medical corps and lowering of the professional standards would inevitably follow.

The Swiss medical profession is also greatly interested in the fate of the project since *Switzerland* is the only other European country where medicine is still a free profession, and *untouched by socialization.* Swiss doctors are urging their French colleagues to continue resistance against the ill-advised efforts and political tomfoolery of the government. Indeed, they point to the example of the American Medical Association which successfully opposed the "demagogic plans" of President Truman in 1949.

As a further attempt at fluoridation of the entire population, several Swiss communities started to distribute *fluorinated table-salt.* To a kilogram packet of salt they add 200 mg of NaF and 10 mg of potassium iodide. This type of salt is available in the cantons of Zürich, Schaffhausen, and Aargau. For certain technical and economic reasons, water fluoridation is not everywhere feasible in Switzerland. As a substitute, the *fluoridation of the cow's milk* has been suggested. One mg of fluorine is added to a quart of milk. In Winterthur, the school milk is also of the medicated type. These unusual forms of fluoride distribution are still in the experimental stage, though under the general approval of the Swiss Medical Academy.

Smoking and lung cancer is now a crucial problem all over the world. In an official report, seven experts of the American Cancer Society recently stated that one of every ten persons who smoke more than 40 cigarettes a

day must eventually die of lung cancer while among non-smokers the frequency of death from lung cancer is 1:275. (To which the British authorities add that die he *must,* but he may do so at 75!). This is, of course, of great concern to the tobacco industry. Now that the cancerigenous substance has been isolated from the cigarette smoke, the French tobacco industry started its *experiments to neutralize* the bad effect of 3:4-benzpyrene in the smoke. A study group of *the Curie Foundation* found, for instance, that certain nitrogenous compounds, when incorporated in the tobacco or in the cigarette paper, could considerably check the formation of benzpyrenes during smoking. Would they be able to manufacture *non-carcinogenic cigarettes* in the future? Until then, the smokers may find a little consolation in the thought that tobacco smoke is *antibiotic* and it kills the Staphylococcus, as a physician in Toulouse found out. A group of doctors in Bordeaux started to prescribe cigarette-smoking for their patients suffering from *diabetes insipidus,* since smoking seemed to bring down the daily urinary output to normal.

Apropos *teen-age smoking! The Bengal Government* authorized the heads of educational institutions that any cigarette, cigar or "beedi" found in the possession of any person under 16 years of age who is found smoking on the premises may be seized and destroyed. Similar authorization was given to the State Special Constabulary in respect to smoking by teen-agers under 16 years in any public place. The order came into effect on New Year's Day this year.

At a recent *Symposium on Problems of Ageing,* held at Liverpool, the suggestion was made that a system should be worked out for the employment of the aged as a real health project since it has been the general experience that lack of physical and mental effort quickens the pace of degeneration. Of course, ageing is a continuous process, and it does not start at an arbitrary age. The various mental and physical abilities have their own crucial years of peak and beginning deterioration. Perhaps, some of the social problems of ageing could be solved if *old people could be adopted* in the same way as children, as suggested by one of the participant doctors at the Symposium. It is obvious that much more data and research is needed in the field of gerontology. This reminds us of the French spinster schoolteacher who had grown old gracefully, remained mentally alert and physically well until a day she walked into a Lyon hospital to *die gracefully at 100* years of age. She represents the rather rare type of death when Life comes to its natural end at the length prescribed by Destiny.

The *University of Milano* authorized and inaugurated a unique course in *Ethnoiatrics* or *Ethno-Medicine* in which the students will be indoctrinated in native medical practices, including medical folklore, in various parts of the semi-civilized world. The course is obligatory for all students of the School of Missionary Medicine and Surgery. There is a great *shortage of doctors,* of course, especially in the subtropical and tropical areas. This may be partly the fault of governments who do not offer sufficient remuneration for medical services. But it is a greater fault of the present medical education which does not prepare the doctor for independent work at isolated stations, and does not encourage him to become a pioneer health agency in backward countries of the world.

Yet, conditions certainly have changed under *the tropics for the doctor* who dares to take an employment in the hot countries. This is partly the merit of the various institutes for tropical medicine and hygiene, partly of such international activities as the World Health Organization. One used to say of the tropical medical service:

"Beware and betide of the Bight of Benin.
For few come out, though many go in."

Now, with the changed conditions and improved sanitation, a doctor in Nigeria who married a nurse and had three children would charge the *myth of the White Man's grave* thus:

"The Bight of Benin is no longer in doubt;
Where two have gone in, now five have come out" . . . *Multa paucis!*

SUSTAINING MEMBERS

It is a privilege to list the firms who have joined The Association of Military Surgeons as Sustaining Members. We gratefully acknowledge their support.

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ASSOCIATION NOTES

Timely items of general interest are accepted for these columns. Deadline is 3rd of month preceding month of issue.

Department of Defense

Ass't Secretary (Health & Medical)—HON. FRANK B. BERRY, M.D.

Deputy Ass't Sec'y—HON. EDW. H. CUSHING, M.D.

MEDICARE

Over six months experience has now been gained under the Medicare Act, PL 569, 84th Congress, which became effective December 7, 1956.

Major General Paul I. Robinson, MC, U. S. Army, Executive Director of the Dependent Medical Care Program, recently reported that there had been over $36,000 hospitalization claims, amounting to over $3,500,000. In the same period there were over 53,000 medical service claims amounting to over $3,600,000.

New contracts were to be negotiated beginning July 1.

DOCTOR DRAFT

There will be no more special registration of physicians, dentists and veterinarians. Beginning July 1, the doctor-draft law as previously known passed out of existence. The new law provides for the retention of an advisory committee to Selective Service; the use of doctors as enlisted men if they refuse commissions when called for duty; and if commissioned the appointment in a rank commensurate with the qualifications of the individual.

Army

Surgeon General—MAJ. GEN. SILAS B. HAYS

Deputy Surg. Gen.—MAJ. GEN. JAMES P. COONEY

SECOND ARMY CONFERENCE

Colonel Francis P. Kintz, Second Army Surgeon, said of the recently held conference at the Ireland Army Hospital, Fort Knox, Kentucky, that "we have started something here that the Surgeon General is interested in and will try to start throughout the Army."

The two day conference was held to "utilize" civilian medical knowledge in the operation of Second Army hospitals. Forty-five doctors and hospital commanders discussed the progress and problems of administration, medical techniques and standards of care.

Representing the Surgeon General's office at the conference were Brig. Gen. Sam F. Seeley, Chief of the Army Professional Services Division, and Col. Douglas B. Kendrick, Chief Surgical Consultant. Maj. General Isidor S. Ravdin, USAR, Ret., chairman of the Second Army medical advisory committee, and Dr. Donald M. Pillsbury, president of the Society of Medical Consultants, were the chief representatives of the consultants.

RETIRED

Lt. Col. George M. Beam, MSC, 5252 North 25th Road, Arlington, Va., with 23 years service.

Lt. Col. Herbert R. Elmore, MSC, 402 Saratoga St., San Antonio, Texas, with 28 years service.

Lt. Col. William T. Ussery, MSC, 358

Kirk Place, San Antonio, Texas, with 27 years service.

Major George D. Featherstone, MSC, 124 East Magnolia St., San Antonio, Texas, with 20 years service.

SGO ASSIGNMENTS

Major Ann Witczak, ANC, formerly Director, Clinical Technician School, Fitzsimons Army Hospital, has been assigned to the Education and Training Division of the Surgeon General's Office.

HOSPITAL ADMINISTRATION GRADUATES

The Army Medical Service School, Brooke Army Medical Center, Fort Sam Houston, Texas, held a graduation ceremony for 58 senior officers who completed the 39-week course in hospital administration on June 21.

Through the school's affiliation with the Graduate School of Baylor University at Waco, Texas, 32 Army and Air Force officers and one medical officer from Pakistan received the Master's Degree in Hospital Administration. This was the highest percentage of degree candidates since June 1951, when the program was started.

The course given is one of fourteen such programs recognized by the Association of University Programs in Hospital Administration in the United States. The professional degree is awarded to officers who have the educational requirements and upon completion of the resident course, research, oral examination, and a year of administrative residency, or its equivalent.

TO VALLEY FORGE HOSPITAL

Major Barbara Ryan, AMSC, recently left the office of the Surgeon General to become Chief, Food Service Division, Valley Forge Army Hospital, Phoenixville, Pa.

Major Ryan is a graduate of the University of New Zealand, has had training at Michael Reese Hospital, Chicago and the Montefiore Hospital, New York City. She has been in military service since 1943.

PROMOTED

The Commanding General of Brooke Army Hospital, Stuart G. Smith, was promoted to Major General, May 10.

Major General Smith has commanded Brooke Army Hospital since June 1954. Prior to that assignment he was Eighth Army Surgeon in the Far East. For that service General Smith received the Distinguished Service Cross.

HONORED

Colonel Joseph L. Bernier, DC, Chief of the Dental and Oral Pathology Section at the Armed Forces Institute of Pathology was recently awarded the Alfred C. Fones Award for 1957 by the Connecticut State Dental Association. He was the first military dentist to achieve this honor.

The Fones Award is given yearly for outstanding service for the betterment of dentistry. It was established in 1941, and is in memory of Alfred C. Fones, Bridgeport, Conn., an originator of the idea of instructing school children about tooth decay.

DEWITT ARMY HOSPITAL

Fort Belvoir, Virginia, recently opened its new hospital (May 24) when patients were transferred from the old cantonment type hospital which was constructed there during World War II. The new hospital is on the main post. It is commanded by Colonel Charles L. Kirkpatrick of the Army Medical Corps, and has been named after the late Brig. General Wallace DeWitt, formerly Commanding General of the Walter Reed Army Medical Center.

SGO ASSIGNMENTS

Major Winifred Riley, AMSC, has assumed her new duties in the Office of the Surgeon General. She will be responsible for all duty assignments of the Army dietitians, physical therapists, and occupational therapists. She succeeded Major Beatrice Whitcomb, a physical therapist officer, who has been assigned to Europe.

NEW MEDICAL SPECIALIST ADVANCED COURSE FOR ENLISTED CAREERISTS

Enlisted men and women of the Army will have available an advanced course in nursing, forty-six weeks in length, beginning next fall.

The primary objective of the new long term course is to train career-minded enlisted personnel in the performance of advanced nursing procedures in all of the clinical areas.

Considerable emphasis in the curriculum has been placed on the care of the patient in the medical management of mass casualties and in atomic warfare situations. The course also includes instruction in emergency procedures to be carried out for patients with medical, surgical or neuropsychiatric disturbances.

Under the present plans, Walter Reed Army Hospital will launch the new course in September. In addition to Walter Reed Army Hospital, the other hospitals are: Brooke Army Hospital, Fort Sam Houston, Texas; Fitzsimons Army Hospital, Denver, Colorado; and Letterman Army Hospital, San Francisco, Calif.

Navy

Surgeon General—REAR ADM. BARTHOLOMEW W. HOGAN
Deputy Surgeon General—REAR ADMIRAL BRUCE E. BRADLEY

HONORED

Rear Admiral George W. Calver, Medical Corps, U.S. Navy, Retired, presently the Attending Physician, Congress of the United States, was elected President-Elect of the American College of Cardiology, at the recent Sixth Annual Meeting of that College in Washington, D.C.

APPOINTED DIRECTOR BIOLOGICAL SCIENCES DIVISION

Dr. Roger D. Reid was named Director of the Biological Sciences Division of the Office of Naval Research, effective June 1.

Dr. Reid was educated in the public schools of Colome, S.D., and received an A.B. degree from the University of South Dakota at Vermillion. He taught in the Gann Valley, S.D. High School and at the University of South Dakota before he went to Pennsylvania State College where he received a Ph.D. degree. He was an instructor and assistant professor of bacteriology there before accepting a position as professor of bacteriology at the University of Idaho.

Dr. Reid came east again—to the Johns Hopkins University School of Medicine—where he taught bacteriology, supervised a bacteriology laboratory at the hospital, and conducted research on various problems in bacteriology. He went on active duty with the Army in 1941, attaining the rank of Lt. Colonel, Medical Service Corps, and is now in the U.S. Army Reserve.

During the war he served as Chief of Laboratory Service, Regional Hospital, Fort Meade, Md., and as Director of the Streptococcus Typing Center, Eighth Service Command Laboratory, Fort Sam Houston, Tex.

After the war Dr. Reid returned to Baltimore as a research bacteriologist with Hynson, Westcott and Dunning. In 1948 he became Head of the Microbiology Branch of the Biological Sciences Division of the Office of Naval Research, a position he will continue to hold in addition to his new assignment.

CORRESPONDENCE COURSE

A new Medical Department correspondence course, Aviation Medicine Practice, (NavPers 10912-A) is now available for enrollment by regular and reserve officer personnel of the Medical Department. This course consists of six assignments and is evaluated at 18 naval reserve promotion and/or retirement points.

Course material includes discussions of: severe physiological stress due to reduced barometric pressure, acceleration, noise, vibration, and danger; physiological requirements for oxygen equipment, pressurized equipment, and other devices designed to make the flyer's environment as normal as

possible; special problems in the fields of ophthalmology and otolaryngology; disturbances of the cardiovascular system resulting from flight; selection of personnel; physical and psychological standards and examinations used in screening and placement; the relation of psychopathology and neuropsychiatry to aviation medicine; aviation dentistry; operational problems; and air evacuation of the sick and wounded.

Applications for this course should be submitted on form NavPers 992 (Revised 2-56), with appropriate change in the "To" line, and forwarded via official channels to the Commanding Officer, U.S. Naval Medical School, National Naval Medical Center, Bethesda 14, Md.

RETIRED

Cdr. Chalmers L. Anderson, MSC, who has been Executive Assistant to the Inspector General Medical, Bureau of Medicine and Surgery, retired after more than 38 years of active service.

Cdr. Matthew J. Millard, MSC, retired after more than 30 years of active naval service.

LCdr. John F. May retired after completing more than 28 years service.

Air Force

Surgeon General—MAJ. GEN. DAN C. OGLE
Deputy Surg. Gen.—MAJ. GEN. OLIN F. MCILNAY

GEN. MCILNAY—DEPUTY SURGEON GENERAL

Major General Olin F. McIlnay, USAF (MC) was designated as Deputy Surgeon General of the Air Force, effective June 24. He has been Director of Plans and Hospitalization in the Office of the Surgeon General.

General McIlnay is a native of Illinois. He received the Bachelor of Arts degree from Cornell College of Iowa in 1924 and the Doctor of Medicine degree from the University of Iowa in 1928. He entered military service the same year.

Official U. S. Air Force Photo

MAJOR GENERAL OLIN F. MCILNAY

Early in World War II General McIlnay became staff surgeon for the Eighth Fighter Command and during the summer of 1942 moved with that command to England. In August 1944 he became staff surgeon for the Second Air Division which was stationed in England. He returned to the United States in 1945 and became assistant surgeon for the AAF Training Command at Fort Worth, Texas, later moving with that command to Barksdale Field, La. In November 1948 he was appointed surgeon for the Air Training Command which moved to Scott Air Force Base in Illinois in 1950, retaining him as its surgeon.

General McIlnay has been awarded the Legion of Merit, the Bronze Star Medal and the Croix-de-Guerre with palm. He is rated Chief Flight Surgeon. The general is a member of the Executive Council of Military Surgeons of the United States.

Public Health Service

Surgeon General—LEROY E. BURNEY, M.D.
Deputy Surg. Gen.—W. PALMER DEARING, M.D.

POLIO

Figures for poliomyelitis for the first 24 weeks of 1957 show that there were 1,126 cases (all types) as compared to 2,218 cases for the same period of 1956. Of those cases, 1,171 were reported as paralytic for the 24 week period of 1956 and 531 for the same period in 1957.

Vaccination against poliomyelitis is a year around procedure. Everyone under 40 years of age should be vaccinated. Just how young may a child be when the vaccine can be given? Dr. Gordon C. Brown, Professor of Epidemiology at the University of Michigan School of Public Health, in an article in the *National Foundation News,* June 1957, stated that "many of the infants (two months and over) were given polio vaccine in one arm and at the same time triple vaccine (diptheria, tetanus and whooping cough), in the other arm." Furthermore, "These studies demonstrated that even very young infants can be vaccinated and protected against polio with no adverse effects. . . . We have known for several years that new-born babies usually have some polio immunity that is 'borrowed' from their mothers. Recent studies have shown that this borrowed immunity is of very short duration. . . . Even when the mother has an extremely high level of polio antibody, her baby's borrowed immunity has usually disappeared by the time it is five or six months old."

COMMITTEE ON AIR POLLUTION

The National Advisory Committee on Community Air Pollution was recently established to assist the Surgeon General of the Public Health Service. The first meeting was held in Washington on June 3 to review the objectives, policies, and accomplishment of the program established by the Public Health Service under a 1955 Act of Congress.

RESEARCH TRAINING

Eighty-two schools of medicine, dentistry and osteopathy will participate in a new Public Health Service research training program.

Outstanding students in medical, dental or osteopathic schools who have completed at least one full academic year have been nominated for participation by their deans. Each student participant will drop out of regular course work during the period of the research training.

The program, established to help increase the numbers of medical, dental, biological and mental health researchers, will provide research training for 140 undergraduates students during the first year. Training will start in September.

Participants in the program will receive full tuition plus a stipend of not over $3,200 per year to be set by the school and an allowance of $350 per year for each dependent.

SEPTAL DEFECTS OF THE HEART

A technique for exactly locating septal defects of the heart has been developed through the use of a dye injected into the heart.

Physicians at the American College of Cardiology Meeting in Washington in May were told of the new diagnostic approach by Drs. Eugene Braunwald, Herbert Tanenbaum, Robinson Baker, and Andrew Morrow, of the Public Health Service's National Institutes of Health, Bethesda, Maryland.

The new approach is unique because it places the dye injection on the left side of the heart at or near the leak and in the path of its outflow.

Concentration of the dye and transit time are measured at the lobe of the ear by an "ear oximeter," a photoelectric cell. In normal subjects the dye concentration is seen as a smooth ascending and descending curve. In septal defects there is a double peak seen on the curve. It is said that the shape of the curve in relation to the location of injection in the left heart tells the surgeon exactly where the opening is.

CANCER DETECTION

Hope for earlier detection and more successful treatment of five types of cancer was expressed by Dr. John R. Heller, Director of the National Cancer Institute, Public Health Service.

Dr. Heller said that plans are moving ahead for extending the cytologic test pro-

gram—already successfully applied to uterine cancer—to include also lung, gastrointestinal, urinary and prostatic cancer.

In Memphis the first examination of 108,000 women led to discovery of about 800 cases of uterine cancer. Dr. Heller pointed out that half of these cases were in the very early preinvasive stage which is practically 100 percent curable and that most of these were wholly unsuspected. Many of the 400 cases found in more advanced stages were also unsuspected, he explained.

Dr. Heller said the National Cancer Institute is in process of setting up four new centers this year to develop the application of cytology to cancer of other body sites.

"Preliminary arrangements have been made," he explained, "for an investigation at Houston, Texas, to develop techniques for detection of lung cancer and at Columbus, Ohio, for detection of cancer of the large intestine. Efforts are being made to find cooperating groups to work with us in establishing projects for research on cytologic detection of prostatic and urinary cancer."

Veterans Administration

Chief Medical Director—WILLIAM S. MIDDLETON, M.D.

Deputy Chief Med. Dir.—R. A. WOLFORD, M.D.

ASSIGNMENTS

Dr. Lyndon E. Lee, Jr., and Dr. Alfred M. Steinman have been appointed to the Research and Education Service of the Department of Medicine and Surgery at the Veterans Administration Central Office in Washington.

Dr. Lee was an instructor in surgery and associate in pharmacology at the University of Michigan Medical School, and now becomes Chief of Surgical Research.

Dr. Steinman, who has been in private practice as a cardiologist and instructor in the department of medicine at the University of the State of New York, becomes Assistant Chief of the Clinical Studies Division.

Ray Q. Bumgarner has been assigned as manager of the VA center at Hot Springs, S.D.

Dr. Roland W. Hipsley has been assigned as manager of the VA hospital at New Orleans, La., to fill the vacancy created by the death of Dr. Anees Mogabgab, April 18.

Dr. Lester J. Kantor has been assigned as manager of the VA hospital at Lebanon, Pa.

Thomas B. May has been assigned as manager of the VA hospital at Columbia, S.C. He served with the Army during World War II, attaining the rank of lieutenant colonel.

Donald S. Slade, has been assigned as manager of the Veterans Administration center at Martinsburg, W.Va., to fill a vacancy created by the retirement of Wales E. Finnegan.

HONORED

Dr. Lee D. Cady, Manager of the Veterans Administration Hospital, Houston, Texas was twice honored recently. The Texas-Louisiana Chapter, Association of Physical and Mental Rehabilitation Therapists, awarded him a plaque and certificate "For Outstanding Contribution in Physical Medicine and Rehabilitation," and the Texas Medical Association awarded him the Governor's certificate of "The President's Committee on Employment of the Physically Handicapped" with "Citation for Meritorious Service in Appreciation for Exceptional Contributions in Advancing the Employment of the Physically Handicapped."

SARCOIDOSIS

Five Veterans Administration hospitals are cooperating in an intensive study of sarcoidosis. They are: VA hospitals at Atlanta, Ga., Dallas, Texas, Madison, Wis., New York City, and Washington, D.C.

Sarcoidosis is much more severe and much more widespread than formerly believed, and causes death in a larger number of patients than heretofore suspected. Such are the findings of a research team in the Veterans Administration.

In a study involving 1,700 cases of sar-

coidosis the team found that the highest rates of hospitalization for white veterans are among those born in Connecticut, Rhode Island, Georgia, Arkansas, North Dakota, Minnesota, Massachusetts, Alabama, Maine, and Virginia with an incidence of 3.3 per 100,000; and for the colored veterans 40.1 per 100,000 with the Southeastern States predominating in cases. The disease is more prevalent in rural communities than in urban.

TRANQUILIZERS

A remarkable change in the types of treatment for mental patients since tranquilizing drugs were started has been reported by the Veterans Administration.

Dr. J. F. Casey, VA director of psychiatry and neurology in Washington, D.C., said the changes include:

Electric shock treatment down from 4,527 patients in fiscal 1955 to approximately 1,000 patients for the first six months of fiscal 1957.

Insulin coma treatment cut from 1,486 patients in fiscal 1956 to only 383 patients for the first six months of fiscal 1957.

Neutral packs and tubs sharply reduced from 15,655 patients in fiscal 1955 to 1,471 patients for the first six months of fiscal 1957.

Privileged patients on tranquilizers increased from 2,500 in fiscal 1955 to 8,500 in the first half of fiscal 1957.

Trial visits away from the hospitals increased from 9,985 patients in fiscal 1955 to 12,351 in fiscal 1956.

Dr. Casey said the tranquilizers also have caused a beneficial chain reaction in reawakening the interest of patients in individual and group psychotherapy, with the result that this form of treatment is on the increase.

Miscellaneous

MEETING

The American Fracture Association will hold its 18th Annual Meeting, September 30-October 2 at Hotel Cortez, El Paso, Texas. Further information may be obtained from W. Compere Basom, M.D., Chairman, 520 Montana St., El Paso, Texas.

BREAKFAST—FHIAA

There will be a breakfast meeting of the Federal Hospital Institute Alumni Association during the Convention of the American Hospital Association at Atlantic City, September 30-October 3, at Atlantic City, N.J.

The speaker will be Dr. E. Dwight Barnett, Professor of Administrative Medicine at Columbia University, and his topic will be "Some New Administrative Concepts that Challenge the Hospital Administrator."

INTERNATIONAL SOCIETY OF INTERNAL MEDICINE

The Fifth International Congress of Internal Medicine will be held at the Sheraton Hotel, Philadelphia, Pa., April 24-26, 1958. This will be the first meeting of the International Society of Internal Medicine outside of Europe.

This Society, the only international one embracing all aspects of internal medicine, was organized in 1948 and largely at the instigation of Professor Nanna Svartz of Stockholm, the physician to the King of Sweden. Dr. T. Grier Miller of Philadelphia is president of the Congress; and Edward R. Loveland, F.A.C.P. (Hon.) is the Secretary-General, 4200 Pine St., Philadelphia, Pa.

The Program Committee includes Frank N. Allan, M.D., Chairman, Boston; Philip S. Hench, M.D., Rochester, Minn.; Carl V. Moore, M.D., St. Louis; Albert M. Snell, M.D., Palo Alto, Calif.; Irving S. Wright, M.D., New York.

Immediately following the meeting the 1958 Annual Session of the American College of Physicians will occur in Atlantic City, April 28 to May 2.

MOUNTAIN TRAINING

In Northern Italy soldiers of the Alpine Division are constantly training for service in the mountains. Medical soldiers are shown

Official Alpine Military School Photo

THE MAN AGAINST THE MOUNTAIN IS HELPING HIS WOUNDED COMRADE OFF THE MOUNTAIN.

Official Alpine Military School Photo

AN ALPINE SOLDIER DEMONSTRATES A METHOD USED TO EVACUATE WOUNDED OFF A MOUNTAIN.

here in training in the evacuation of sick and wounded, a task that requires ingenuity and strong muscles.

SOMETHING NEW

For the children, for the ladies; yes, maybe the men would like them, too—colored plaster of Paris bandages. They are available now in: red, yellow, blue, and a soft flesh tone. Of course, the white will be available! Now, don't fall and break an arm just to get the colored cast.

SAFETY FIRST

Many tombstones are carved by chiseling in traffic.

Leisure.

AUTOMATION

Two secretaries were overheard discussing a new office machine: "I know that new electronic computer does the work of three men," one observed morosely, "but personally I'd rather have the men." *Public Service —London.*

FREE TRAVEL GUIDES

The Best Western Travel Guide listing motels in 26 western states and points in Canada may be obtained free from Best Western Motels, 4201 E. Ocean Blvd., Long Beach, Calif.

Quality Courts, Inc. guide for east of the Mississippi can be obtained free from Quality Courts, Inc., 207-C Seabreeze Blvd., Daytona Beach, Fla.

REPORTS AVAILABLE

The Value of Treatment of Experimental Cerebral Edema With Intravenous Hypertonic Glucose, Albumin, and Dextran. The Rush Laboratory of Pathology, Presbyterian Hospital, Chicago. 28 pages. Price 75¢.

Honor Roll

Since the publication of our last list, the following sponsored one or more applicants for membership in the Association:

Lt. R. C. Budell, MC, USNR
Capt. Stephen Giorlando, MC, USA
Cdr. Mary Grimes (NC), USN
Capt. Henry C. Henn, MSC, USA
Col. Amos R. Koontz, MC, Md, NG
Col. A. F. Libasei
Capt. Arthur Master, MC, USNR
Major D. E. Patterson, MC, USAR
Lt. (jg) Irvin O. Stallings, MSC, USN.

OBITUARIES

Col. Clyde D. Oatman, U. S. Army, Ret.

Clyde Danford Oatman, Colonel, Medical Corps, U. S. Army, Retired, died after a long illness at his home in San Antonio, Texas, April 27, at the age of 75.

Colonel Oatman was a native of New York. He received his medical degree from Syracuse University in 1906. During World War I he was commissioned in the Officers Reserve Corps and entered on active duty in the Army Medical Corps in November 1917. For about one year after leaving the Army in 1919 he served with the U. S. Public Health Service. In 1920, he was commissioned in the Regular Army Medical Corps and served until his retirement in March 1946. Colonel Oatman served for four years in the Canal Zone (1924-1928).

After his retirement from the Army, Colonel Oatman served on the staff of the San Antonio (Texas) State Hospital for four years. He was a member of our Association for 36 years.

Colonel Oatman is survived by his widow who resides at 206 Prinz Drive, San Antonio, Texas; and a son, Colonel Clyde D. Oatman, Jr., Post Dental Surgeon, Fort Benning, Ga.

Col. Eugene R. Whitmore, U. S. Army, Ret.

Eugene Randolph Whitmore, MC., U. S. Army, Retired, died at Walter Reed Army Hospital, Washington, D.C., May 5 at the age of 82.

Colonel Whitmore was a native of Wisconsin. He received his medical degree from the College of Physicians and Surgeons in Chicago in 1899; the D.P.H. degree from Johns Hopkins University in 1921; and the Ph.D. degree from Georgetown University in 1929. He was appointed an Army surgeon in 1901 and served until his retirement in 1920. During his Army career he specialized in pathology and was a professor of pathology in the Army Medical School. He was also curator of the Army Medical Museum. After retirement he associated himself with several hospitals in Washington, D.C., as a pathologist, and also instructed at Georgetown University.

Colonel Whitmore is survived by his widow, Mrs. Josephine Baker Whitmore, 2139 Wyoming Ave., N.W., Washington, D.C.

Interment was at Arlington Cemetery.

Col. Chas. W. Comfort, NG, Ret.

Charles W. Comfort, Colonel National Guard, Conn., Retired, died at the Rocky Hill Veterans Hospital, New Haven, Conn., on May 6, at the age of 71.

Colonel Comfort was a native of Pennsylvania. He received his medical degree from the Yale University School of Medicine in 1911. During World War I he was a medical officer with the 26th (Yankee) Division. Between World Wars I and II, he organized the 118th Medical Regiment of the 43d National Guard Division and at the outbreak of World War II entered as its Division Surgeon. He later commanded station hospitals at San Luis Obispo, Calif., Camp Adair, Ore., and Camp Beale, Calif. In 1946 he returned to his practice of medicine at New Haven, Conn.

Colonel Comfort was the author of two articles on the National Guard Medical Service published in the *Military Surgeon*, the former name of this journal. He was president of the Association of Military Sur-

geons of the United States during 1932.

He is survived by his cousin: Mrs. Sarah Moyer of Norristown, Pa.

Brig. Gen. Raymond F. Metcalfe, U. S. Army, Ret.

Raymond Franklin Metcalfe, Brigadier General, Medical Corps, U. S. Army, Retired, died at the Army and Navy Hospital, Hot Springs, Arkansas, May 8, at the age of 80.

General Metcalfe was a native of Salamanca, New York. He received his medical degree from Buffalo Medical School in 1900 and was commissioned in the Army Medical Corps the following year.

Very early in his military career General Metcalfe was sent to the Philippines. He had two tours there in the first ten years of his service, and during his military career completed 9½ years in the Islands. During World War I he served in France with the 36th Division and the 1st Army Corps, being chief surgeon of both units. For his work during the influenza epidemic he was awarded the Distinguished Service Medal.

General Metcalfe was a prominent Army surgeon. He contributed to medical literature, five articles of which were published in the *Military Surgeon,* the former name of this journal. In 1939 he became Commanding Officer of the Walter Reed Army Hospital. In 1941 he retired from the military service but was recalled to duty after Pearl Harbor, and retired for the second time in 1946.

He is survived by a brother, Harry V. Metcalfe, Seattle, Washington. Interment was at Arlington National Cemetery.

Lt. Col. Walter R. deForest, U. S. Army, Ret.

Walter R. deForest, Lt. Colonel, Medical Corps, U. S. Army, Retired, died at Hamilton, Ohio, May 18, at the age of 47.

Colonel deForest was a native of Syracuse, New York. He received his medical degree from Columbia University College of Physicians and Surgeons in 1937. He entered military service in 1940. During his military career he received a Master of Public Health degree from Harvard University School of Public Health. During World War II he served in the European Theater.

At the time of his retirement from the Army, Colonel deForest was chief of preventive medicine at Fort Knox, Kentucky. At the time of his death he was Director of Health at Hamilton, Ohio.

Colonel deForest is survived by his wife and three children.

BOOK REVIEWS

THE PRINCIPLES AND ART OF PLASTIC SURGERY. Two Volumes. By Sir Harold Gillies and D. Ralph Millard, Jr. Foreword by Jerome Pierce Webster, M.D. 690 pages with 2,472 illustrations, 122 in color. Little, Brown & Company, Boston. 1957. Price $35.00.

These two volumes represent the works of a master surgeon covering forty years of experience. In them will be found a tremendous amount of information reported in a way that is new and dramatic. They may be read with a viewpoint of text book, reference work, or for the sheer pleasure of an exciting story.

The volumes start with plastic surgery of World War I. Passing on, general principles and technical tips are presented. The application of all kinds of flaps and pedicles are shown. The treatment of lymph edema, nevi, hemangiomata, defects of the ear, radiation burns and cancer cases is dealt with in this work. Harelip and cleft palate with alterations of bony architecture are covered. Repairs for genital lesions extend from the handling of hypospadias to sexual conversion. Cosmetic surgery is illustrated by face lifting, rhinoplasty, breast, torso, and extremity modifications.

The treatment of trauma gives the British history and plastic surgery of World War II, the general treatment of burns, hand plastics, with illustrations on burns, syndactalism, pollicisation, carpo-pedal transplant and autografting. There are also methods of handling defects of all facial bones along with repairs for eyelids, sockets and facial paralysis.

The presentation concludes with a day in the clinic. Dr. Gillies is shown in action handling all phases of patient care.

Throughout the books credit is given to surgeons who have made contributions to the authors.

The volumes are recommended not only to plastic surgeons but also to all surgical readers as highly interesting and informative.

COL. BERNARD N. SODERBERG, MC, USA.

PRACTITIONERS' CONFERENCES. Vol. 5. Held at New York Hospital-Cornell Medical Center. Edited by Claude E. Forkner, M.D., Professor of Clinical Medicine, Cornell University Medical College. 396 pages. Appleton-Century-Crofts, Inc., New York. 1957. Price $6.75.

This is the fifth volume of a series of teaching clinics designed for instruction and enlightenment of the general practitioner. These conferences, which are held annually at the New York Hospital-Cornell Medical Center, are prepared and presented for the benefit of practicing physicians who may thus share in some of the advantages of a great Medical Center.

The multiphasic approach is used in which the moderator of the conference, the panel of experts and the audience participate. The topics include discussions of the following problems: sinusitis; peptic ulcer; mitral stenosis; carcinoma of the cervix; essential hypertension; carcinoma of the breast; cerebral hemorrhage, thrombosis and embolism; factors concerned with abnormal coagulation and thrombosis; sterility and impotence, amebiasis; fluid and electrolyte balance in relation to surgery and acute medical emergencies; pitfalls in laboratory diagnosis; amenorrhea; and dysmenorrhea.

In development of each subject, the underlying principles of basic sciences are integrated with the problem under discussion, which is the keynote of these conferences. Their informality is delightful, subject matter stimulating and the method of presentation refreshing. The material is presented in a practical and delightful style. Numerous charts, tables and diagrams pictorialize the "talking text."

This volume is highly recommended whether one be a family doctor, an internist, surgeon or other specialist. Since the proof of the pudding is in the eating, the reader is urged to read, mark, learn and inwardly digest the contents of this practical volume of "Practitioners' Conferences."

CAPT. CHRISTOPHER C. SHAW, MC, USN

DORLAND'S ILLUSTRATED MEDICAL DICTIONARY, 23rd edition, with more than 700 illustrations and 50 plates. W. B. Saunders Company, Philadelphia and London. 1957. Price $12.50.

Formerly known as the *American Illustrated Dictionary* by Dorland, the new name *Dorland's Illustrated Medical Dictionary* does honor to two great men who recently died. Dr. W. A. Dorland, editor of the twenty-two editions, died September 1956 at the age of 92; Dr. E. C. L. Miller, a valuable contributor, died in July 1954 at the age of 87.

This 23rd edition has many consultants and major contributors in all fields of medicine, dentistry, and philology. The size of the book is slightly increased but its weight remains practically the same. Words

stand out in bolder type. Dosages are deleted with the names of drugs in the text. However, to make up for this and a method which seems to make more sense, is the addition of a section, *Modern Drugs and Dosage*, which contains drugs evaluated by the Council on Pharmacy and Chemistry of the A.M.A. Another valuable addition is the section on *Fundamentals of Medical Etymology.*

We like this dictionary, and believe others will also.

COL. ROBERT E. BITNER, USA, RET.

CHILDREN'S EYE PROBLEMS. By Emanuel Krimsky, M.D., Attending Staff in Ophthalmology, St. John's Hospital, Long Island City, Flower and Fifth Avenue and Metropolitan Hospitals, New York City. 175 pages, 36 illustrations. Grune & Stratton, Inc., New York and London. Price $6.00.

There has long been a need for a text illustrating American views on pediatric ophthalmology. Practically every complaint and condition which a child could have is covered in this small book, yet there is no redundancy or stuffiness. There is a complete absence of academic double-thought and hyperspecialized terminology. The meat of each complaint or condition is presented in a few well-chosen sentences, and its importance and treatment dismissed with a few well-chosen words; yet the format of a symptom-list is avoided by the author's interesting evaluations and experiences.

The author's stress on psychological evaluation of the child is refreshing and encouraging. This emphasis, plus the many excellent photographic illustrations showing his techniques, are ample evidence of his unusually wide practical experience in the area under consideration.

This book will be invaluable to pediatricians, and should help cover the pitiful inadequacies of standard undergraduate training in ophthalmology. The very fact that it contains so few statements which ophthalmologists could argue over, is a mark of what a practical contribution we have here.

CAPT. HARRY HORWICH, USAF (MC)

PRACTICAL DERMATOLOGY. By Samuel M. Peck, M.S., M.D., Dermatologist to Mt. Sinai Hospital, New York; with Laurence L. Palitz, M.D., Ph.D., Adjunct Attending Dermatologist, Montefiore Hospital, New York. 380 pages, 122 figures. Landsberger Medical Books, Inc., distributed by The Blakiston Division of the McGraw-Hill Book Co. 1957. Price $7.00.

This brief text covers the subject of dermatology in a manner which is as informative as it is informal. The senior author has had wide experience in civilian practice and as a consultant for the Public Health Service. In an intimate, conversational style he has given us the benefit of his definite opinions concerning the etiology, "pathologic-physiology" and therapy of the common skin disorders.

A highly personal book of this type invariably suffers from the defects of its virtues. Some of the statements may seem somewhat arbitrary. For example, the authors recommend repeated smallpox vaccinations as an effective treatment for recurrent herpes. This measure is now considered by many to be of dubious value, and scarcely worth the time and effort involved. The assertion that "acne is much more frequent among young males than among young females" is not quite accurate; the preponderance, if any, is slight. In the discussion of pediculosis pubis one reads that "it is most uncommon to find the eruption spreading to all hairy areas." Presumably this should read "not uncommon."

The photographs are not of uniform excellence. Taken from the collection of the authors they are not always clear or even characteristic. The inclusion of several cuts of rare and unusual conditions is of interest to the specialist, but may be of limited value to the general practitioner for whom this handbook is designed.

The undoubted value of this book lies in the fact that it does represent accurately and unequivocally the accumulated experience and thinking of one of our leading dermatologists.

LT. COL. MORRIS H. SAFFRON, MC, USAR

FROM WITCHCRAFT TO WORLD HEALTH. By S. Leff, M.D., D.P.H., and Vera Leff. 236 pages. The Macmillan Company, New York. 1957. Price $4.50.

The authors, a husband and wife team, have written a popular account of the development of disease prevention from primitive to modern times; from spells and incantations to vaccinations, pure water, and national and city health organizations. Particularly good are the descriptions of Egyptian and classical medicine. Throughout the book the authors give considerable space to the social background which adds much to the understanding of the health problems of ancient, medieval, and modern times. There is a tendency to frequently contrast wealth and poverty and class differences and to ascribe bad health conditions to these causes. In speaking of tropical diseases the tremendous preventive work of the great colonial medical services such as the Indian Medical Service are scarcely mentioned.

The illustrations, largely made available through the Wellcome Historical Medical Library are fine and add greatly to the book.

CAPT. LOUIS H. RODDIS, MC, USN, RET.

THE OFFICER'S GUIDE. 23rd Ed. 505 pages, illustrated. The Military Service Publishing Co., Harrisburg. 1957. Price $5.00.

The rapidity of change in today's Army creates

a need for a ready reference for both the new officer at his first station and his brother of longer service. This book, the reference of choice, is the 1957 edition of a series which began in 1930 and has been perenially revised since 1941.

The present volume contains the customary information about posts and stations, reporting thereat, official and unofficial life while at station, and departure therefrom, all up to date as of the time of publication. Chapters on the composition and wearing of the new uniforms, the new efficiency report, career planning, and the army educational system are of value to all officers. The military surgeon will find those portions pertaining to pay and allowances, survivor benefits, social security, medicare, and retirement of particular interest.

Although the "pentomic" organization of the infantry division is discussed in general terms, the reorganization of armor and airborne is slighted. Equally skimpy is the section dealing with federal income tax. No reference to state income tax is included. Despite these deficiencies (which ought to be repaired in future editions) the book is well worth its price and should be within arm's reach of every officer. No single reference can ever answer all questions but this one closely approximates that end.

CAPT. SAMUEL L. CROOK, MSC, USA

PEDIATRIC CARDIOLOGY. By Alexander S. Nadas, M.D., F.A.A.P., Ass't. Clinical Professor of Pediatrics, Harvard Medical School. 587 pages, 343 figures. W. B. Saunders Company, Philadelphia and London. 1957. Price $12.00.

This book has the attributes of a classic and fills a great need in current medical literature. The author has combined his rich and wide experience with an unusual ability to write clearly, forcefully, fascinatingly, and instructively. He correlates superbly clinical, radiologic, electrocardiographic, phonocardigraphic, physiologic and pathophysiologic findings and variations in both acquired and congenital heart disease in children.

This book is smartly planned. It is divided into four parts. Part One, "The Tools of Diagnosis" covers all the facilities available to the clinician for diagnostic study; Part Two is devoted to acquired heart disease; Part Three, to congenital heart disease; Part Four, anesthesia for children with heart disease. This last section is written by Robert M. Smith, M.D., Chief Anesthesiologist, The Children's Medical Center, Boston, Massachusetts.

The author has modified standard classifications of heart disease to great advantage by the application of current knowledge plus a great measure of common sense.

It is difficult to offer any criticism which the author himself has not foreseen. Perhaps in future revisions he could expand the section on embryologic development of the heart and as future advances in hypothermia, pump oxygenators, and open heart surgery unfold these topics will require fuller coverage.

Dr. Nadas has very wisely summarized all his 371 references from Abbott to Zoll at the end of his book rather than scattering them repetitiously at the conclusion of each chapter.

This text is heartily and unequivocally recommended to pediatricians, internists, cardiologists, and thoracic surgeons. It will naturally have its greatest appeal to those medical officers allied with the above mentioned specialties.

CAPT. JULIAN LOVE, MC, USN, RET.

A.M.A. SCIENTIFIC EXHIBITS, 1956. A Record of the Scientific Exhibits presented at the Annual Meeting of the American Medical Association 1956. Grune & Stratton, Inc., New York and London. 1956. Price $10.00.

This is the second volume recording the Scientific Exhibits at the Annual Meeting of the American Medical Association at Atlantic City in June 1956. The first attempt to record in printing, with selected photographs, was accomplished in 1955. That volume appeared as the A.M.A. Scientific Exhibits, 1955 and was priced at $20.

The present volume, A.M.A. Scientific Exhibits 1956, is published at half the price of the 1955 volume, but this fact should in no way infer there is any lessening in the value of the book. The reduction in price is possible because of the inclusion of some commercial exhibits which space has been paid for in advertising.

Here are the best of the scientific exhibits recorded in pictures which will give the physician a good post graduate course in medicine.

COL. R. E. BITNER, USA, RET.

DISEASES OF THE HEART. 2nd Ed. By Charles K. Friedberg, M.D., Attending Physician, The Mount Sinai Hospital, New York; Associate Clinical Professor of Medicine, College of Physicians and Surgeons, Columbia University. 1161 pages, illustrated. W. B. Saunders Company, Philadelphia and London. 1956. Price $18.00.

This is the second edition of this well recognized and outstanding text. The author remains loyal to his original concept—"to provide a comprehensive and integrated exposition of the diseases of the heart." In order that the text continue to remain abreast with the advances of diagnosis and therapy the author believed the need for this second edition to be imperative.

The text is divided into seven parts. Part One, which was added, deals with the graphic methods of cardiac examinations. This addition became necessary because of the many recent contributions to this field. Extensive revisions of the text are apparent in the sections of cardiac surgery—these concern new techniques of direct vision surgery

such as inflow stasis, hypothermia, external shunts and pump-oxygenators, and the results of their practical application. Additional revisions other than those which concern the surgical aspects of heart disease, notably those in medicine, have not been omitted. Extensive revisions are reflected in sections in detailed discussions in the newer aspects of therapy. The treatment of intractable heart failure is clearly discussed along with the use of quinidine, digitalis, Pronestyl and mercurial diuretics, the use of oral diuretics, very low sodium diets, resins, etc. The result of a critical examination of a series of drugs recently introduced for the treatment of angina pectoris is included. Excellent reviews both of the prevention as well as the treatment of rheumatic fever are available to the reader. The controversial questions as applied to anticoagulant therapy in acute myocardial infarction, the effectiveness of the new antihypertensive drugs and bed rest versus chair rest are amply considered. The chapter on hypertensive heart disease has been greatly enlarged, largely because of the therapeutic considerations, especially as provided by the various newer antihypertensive drugs.

Additional revisions or changes are noted on pathophysiology of cardiopulmonary disease, lung volume and tests of pulmonary function. The newer aspects of the relation of lipids and lipoproteins, of cholesterol and fat intake and of the hormones to coronary atherosclerosis are critically considered. The use of cardiac massage, defibrillation, the external cardiac pacemaker, Starling curves of cardiac function, vectorcardiagraphic findings in cardiac hypertrophy, bundle branch block and myocardial infarction, electrolytes in congestive failure, the more recent contribution to the therapy of the arrhythmias, the Wolff-Parkinson-White syndrome, diagnostic tests for pheochromocytoma, the varities of the syncope, and the early diagnosis and treatment of bacterial endocarditis and hyperserotoninemia are carefully considered.

The final part or section is devoted to Special Problems in Heart Disease such as pregnancy, surgical procedures in the cardiac patient, and medicolegal problems in cardiac disease.

All material is carefully integrated by cross reference in order to avoid unnecessary repetition. Full and up-to-date references are found at the close of each chapter. Reproduction of X-ray films, and electrocardiograms and diagrams amplify the text.

COL. CHARLES R. MUELLER, USA, RET.

CLINICAL PATHOLOGY: APPLICATION AND INTERPRETATION. Second Ed. By Benjamin B. Wells, M.D., Ph.D. Director of Clinical Investigation, The Lynn Clinic, Detroit. Former Professor of Medicine and Chairman of the Department of Medicine, Creighton University School of Medicine, Omaha. 488 pages, illustrated. W. B. Saunders Company, Philadelphia and London. 1956. Price $8.50.

This is the second edition of a highly practical and valuable volume for medical students and practitioners who are or should be interested in the application and interpretation of clinical laboratory findings.

This book contains a wealth of common-sense advice on everyday clinical problems. It is divided into ten chapters dealing with clinical laboratory studies pertaining to infectious diseases, diseases of the gastrointestinal system, the respiratory and cardiovascular systems, the kidney and urinary tract, blood and bloodforming organs, metabolic and endocrine disorders, clinical studies in surgery and in obstetrics with a final chapter on the technic of laboratory procedures.

Under each major heading the material is arranged in a practical manner, beginning with a statement of the clinical problem and a brief discussion of pertinent laboratory data and their significance in diagnosis, therapy and prognosis. Theoretical discussion is held to a minimum and no attempt is made to include tests of doubtful value or of questionable application.

The physician, perhaps unwittingly, sits in the seat of judgment in evaluation of reports from the laboratory. His reputation as a "clinical judge" will be greatly enhanced if he familiarizes himself with the contents of this volume and in so doing learns to appreciate the philosophy of the author, who not only is a leading clinical pathologist but also a former professor of medicine and can therefore view his own specialty in perspective.

CAPT. CHRISTOPHER C. SHAW, MC, USN

DISEASES OF THE HEART AND CIRCULATION. 2nd Ed. By Paul Wood, O.B.E., M.D., F.R.C.P., Director, Institute of Cardiology, London. 1005 pages, illustrated. J. B. Lippincott Company, Philadelphia. 1956. Price $15.00.

The author of this text is a physician who has had a vast experience, who bases his observations and writings upon sound physiologic and pathophysiologic knowledge coupled with a keen sense of clinical observation and study. He possesses a tremendous command of the literature, American as well as English, and he enhances, thereby, the teaching value of the book to an immeasurable degree.

In the earlier chapters Dr. Wood analyzes information obtained by history, symptoms and physical findings and knowledge elicited by graphic aids, x-rays, special studies and correlates normal findings and the variations therefrom with physiology and pathophysiology. The electrocardiograms, phonocardiograms, pulse, venous pressure tracings and angiocardiograms he has chosen for illustration have outstanding teaching value.

The later chapters cover various disorders of the heart in accordance with an etiologic classification—congenital, infectious, toxic, hormonal, iodiopathic, degenerative, traumatic and psychiatric.

The illustrations are profuse, most instructive and conveniently located in relation to the printed text. Dr. Wood has employed a newer type of numbering his illustrations that could be used advantageously by others. There is appended to each chapter a most comprehensive listing of references.

This work is so meritorious that this reviewer is loathe to offer even minor criticisms. There are some typographical errors. Patient's weights in scientific publications should not be expressed in stones, and as an American, this reviewer would recommend the elimination of vowel ligatures which, however, seem to be as dear to the English as tea. The expressions mg percent and grams percent are incorrect. These objections are of little significance compared to the general excellence of the book. The presentation of the subject of auscultation, and the searching analysis of the 20 cardiac murmurs are outstanding.

Dr. Wood's book on Cardiology can be compared most favorably with the best American texts on Heart and Circulation.

CAPT JULIAN LOVE, USN, RET.

SICK CHILDREN. Diagnosis and Treatment. 7th Ed. By Donald Paterson, M.D., Consulting Physician to the Hospital for Sick Children; and Reginald Lightwood, Director, Pediatric Unit, St. Mary's Hospital Medical School, University of London. 539 pages, illustrated. J. B. Lippincott Co., Philadelphia and Montreal. 1956. Price $8.75.

Our British colleagues have revised the 1949 edition of this book with the main emphasis on the diagnosis and treatment of the more common diseases seen by the pediatrician. The new topics are: diseases of children in the tropics; disorders of the nervous system; mental defect; history taking and clinical examination; the care of the premature infant; cardiac disorders; rheumatism and carditis.

The appendixes are very informative. They include drug dosages, electrolytes of body fluids, and an ossification index. The topic headings are clear and the text is to the point. The diagnosis and treatment are not obscured by redundant words. Aside from one or two British proprietary foods, the American physician should find nothing strange in this book.

The general practitioner as well as the pediatrician will find this compact volume very helpful when he has a complicated problem with a sick child.

PHILIP H. SMITH, M.D.

INDUSTRIAL DEAFNESS. Hearing Testing and Noise Measurement. By Joseph Sataloff, M.D., Assistant Professor of Otology, Jefferson Medical College of Philadelphia, and Consultant in Audiology, Veterans Administration. The Blakiston Division, McGraw-Hill Book Company, Inc., New York, Toronto, London. 1957. Price $8.00.

This interesting book is intended as a guide to otologists, industrial physicians, lawyers, executives, and labor leaders, on causes and control of hearing loss from exposure to intense noise.

In plain language it details all aspects of noise measurement and audiometric testing. The author shows how one may survey a plant to determine whether or not there is too much exposure of workers to noise. This is no simple task. Many instruments are used. The sound survey meter, the sound level meter, the octave-band analyzer, and many other instruments are used.

Important questions are discussed, such as, "how often should audiograms be performed; should an applicant with deafness work at a hazardous noise level; when should a worker be removed from a noisy job because of hearing loss?" For those interested in the subject, this book is important.

PHILIP H. SMITH, M.D.

NEW BASES OF ELECTROCARDIOGRAPHY. By Demetrio Sodio-Pallares, M.D., Chief of Dep't. of Electrocardiography at the National Institute of Cardiology of Mexico; with collaboration of Royall M. Calder, M.D., Clinical Professor of Medicine, Graduate School, Baylor University. 727 pages, illustrated. The C. V. Mosby Company, St. Louis. 1956. Price $18.50.

This book is a translation of the 3rd edition of this work, originally printed in Spanish. It reflects the author's experience of many years of teaching in the Department of Electrocardiography at the National Institute of Cardiology of Mexico as well as that of his former teacher, the late Frank N. Wilson.

In this work the student is taught the intelligent evaluation of the tracing by the correlation of it with the clinical, pathological and, finally, the findings at the post mortem table. He is introduced to the treatise by a discussion of "Principles of Electricity" and "Electrophysiology." The electrical axis of the heart is most clearly presented. The chapters which follow reflect the direct application of these data, rather than the usual long drawn out detailed descriptions usually found in texts of clinical electrocardiography. Vectorcardiography, the ventricular gradient and intracavitary potential are fully and clearly presented in separate chapters. An appendix of seventy pages is available to the student interested in the mathematics of electrocardiography. Many diagrams and electrocardiograms amplify the text. A comprehensive bibliography is included which, unfortunately, is not correlated to the text.

COL. CHARLES R. MUELLER, USA, RET.

CORNEAL GRAFTS. Edited by B. W. Rycroft, O.B.E., M.D., F.R.C.S. (Eng.). 15 contributors. 285 pages. Butterworth & Co., Ltd., London. Distributed by The C. V. Mosby Company, St. Louis. Price $13.50.

Corneal Grafts, edited by the English author B. W. Rycroft, is an inspiring work presented in lucid style and easy mastery. In the early section of the book, physiology of the cornea along with anatomical essentials are given by the eminent physiologist Hugh Davison. Histopathology of the graft with beautiful illustrations are presented with stages of healing in detailed study.

Indications and contraindications, and selection of cases for keratoplasty are given in most detailed fashion. Each pathological condition is reviewed and treatment is recommended. Therapeutic lamellar grafts are exhibited and the merits of each are explained. Explanation of techniques by various authors make the book of more value to the surgeon.

In the last chapters Dr. Rycroft presents a portion of the book on preservation of donor grafts and instruments of value in transplantations. A. Edward Maumenee gives a fine chapter on biological response to homografted tissue.

In presenting this surgical treatment of cornea Dr. Rycroft has brought to light the highest calibre thinking of the present time and has brought up to date new methods of handling difficult problems.

COL. WILLIAM L. SPAULDING, MC, USA

PHYSIOLOGY OF THE OCULAR AND CEREBROSPINAL FLUIDS. By Hugh Davson, D.Sc., Honorary Research Associate, University College, London, 388 pages, illustrated. Little, Brown and Company, Boston, 1956. Price $14.00.

This is a splendid critique of the evidence on the formation of the ocular and cerebrospinal fluids, a subject of particular significance to the ophthalmologist and the neurosurgeon interested in glaucoma and increased cerebrospinal fluid pressure.

The anatomy suggesting sites of formation of these fluids is reviewed; the mechanisms of ultrafiltration, secretion, osmosis, dialysis, Donan's equilibrium, and flow are analysed for their influence of the constituents of these fluids; a comparison of the composition of the aqueous, spinal fluid, and plasma is presented; the nature of the blood aqueous and blood cerebrospinal fluid barriers, and the transport of various constituents across these barriers is discussed.

The author with incisive logic analyses the experimental method, the data, and the interpretations. As a consequence, a complex subject is presented with insight and clarity.

CDR. RUDOLPH P. NADBATH, MC, USN

LIVER: STRUCTURE AND FUNCTION. Hans Popper, M.D., Ph.D., Director, Dep't. of Pathology, Cook County Hospital; and Fenton Schaffner, M.S., M.D., Instructor in Medicine, Northwestern University Medical School. 777 pages, 204 illustrations. The Blakiston Division, McGraw-Hill Book Co., Inc., New York, Toronto, London. 1957. Price. $20.00.

A wealth of information is contained in this book. The print is small but quite legible. The bibliography alone numbers 60 pages with 3,735 references. Illustrations are used freely and consist of excellent photomicrographs, photographs, diagrams and a number of Netter's anatomical drawings.

The author's aim is to relate functional changes to structural changes but this is not always easy in such a complex organ as the liver.

The first twenty chapters are devoted to a discussion of normal structure and function. The next ten chapters include discussions of jaundice and such structural changes as liver cell degeneration and necrosis, inflammation, fatty metamorphosis, cirrhosis and cholestasis together with associated functional changes.

Part III contains descriptions of the various tests of liver function. Parts IV and V include discussions of diffuse and focal diseases of the liver. Three chapters are devoted to tumors of the liver and four chapters to a discussion of the part the liver plays in the proper functioning of other organs.

The senior author being a pathologist and the junior author an internist, the book has been written with the needs of both specialists in mind. The authors have successfully related the various clinical manifestations of liver disease to changes in structure and accompanying alterations of normal physiology and biochemistry.

This book will serve as a valuable reference work to all who must face the complex problem of dealing with liver disease.

COL. HUGH R. GILMORE, JR., USA, RET.

NEW BOOKS

Books may be ordered through the Association.

Methods of Effective Management of Breast Diseases, by C. D. Haagensen, M.D. W. B. Saunders Co., Philadelphia, Pa. Price $16.00.

Occupational Diseases of the Skin, by Louis Schwartz, M.D., Louis Tulipan, M.D., and Donald J. Birmingham, M.D. Lea & Febiger, Philadelphia, Pa. Price $18.00.

Medical Mycology: Laboratory Manual, by E. S. Beneke. Burgess Publishing Co., Minneapolis 15, Minn. Price $4.00.

Practical Gynecology, by Walter J. Reich, M.D. and Mitchell J. Nechtow, M.D. J. B. Lippincott Co., Philadelphia, Pa. Price $12.50.

Medical Licensure Examinations, edited by Walter L. Bierring, M.D. J. B. Lippincott Co., Philadelphia, Pa. Price $10.00.

Modern Therapy in Neurology, Edited by Francis M. Forster, M.D. The C. V. Mosby Co., St. Louis, Mo. Price $12.00.

Calderwood's Orthopedic Nursing, 4th ed., Revised by Carroll B. Larson, M.D., F.A.C.S. and Marjorie Gould, R.N., B.S., M.S. The C. V. Mosby Co., St. Louis, Mo. Price $5.75.

Diseases and Disorders of the Colon, by Anthony Bassler. Charles C Thomas, Publisher, Springfield, Ill. Price $6.75.

Clinical Applications of Suggestion and Hypnosis, by Wm. T. Heron. Charles C Thomas, Publisher, Springfield, Ill. Price about $3.75.

Some Milestones in the History of Hematology, by Camille Dreyfus, M.D. Grune & Stratton, Inc., New York, N.Y. Price $4.50.

Clinical Pathology in General Practice, by Specially Commissioned Articles from the British Medical Journal. J. B. Lippincott Co., Philadelphia, Pa. Price $5.00.

Hutchison's Clinical Methods, 14th ed., by Donald Hunter, M.D. and R. R. Bomford, D.M. J. B. Lippincott Co., Philadelphia, Pa. Price $6.00.

A Textbook of Histology, by Alexander A. Maximow, and Wm. Bloom. W. B. Saunders Co., Philadelphia, Pa. Price $11.00.

The Treatment of Burns, by Curtis P. Artz, M.D. and Eric Reiss, M.D. W. B. Saunders Co., Philadelphia, Pa. Price $7.50.

Mental Depressions and Their Treatment, by Samuel Henry Kraines, M.D. The Macmillan Co., New York, N.Y. Price $8.00.

Alcoholism. A Treatment Guide for General Practitioners, by Donald W. Hewitt, M.D. Lea & Febiger, Philadelphia, Pa. Price $3.00.

Essentials of Clinical Proctology, 3rd ed. by Manual G. Spiesman, M.D. and Louis Malow, M.D. Grune & Stratton, New York, N.Y. Price $8.75.

Signs and Symptoms, 3rd ed. Edited by Cyril Mitchell MacBryde, M.D. J. B. Lippincott Co., Philadelphia, Pa. Price $12.00.

Traite des Urgences en Chirurgie, by P. Brocq, P. Poilleux and R. Charbrut. Two volumes. Masson et Cie, 120, Boulevard St. Germain, Paris, France.

Les Nouveaux Syndromes Hermorragiques la Dysprothrombie, by Paul Chevallier, and A. Fiehrer. Masson et Cie, 120, Boulevard Saint-Germain, Paris, France. Price 1,500 fr.

Local Anesthesia and Pain Control in Dental Practice, by Leonard M. Monheim, B.S., M.S., D.D.S. The C. V. Mosby Co., St. Louis, Mo. Price $9.75.

Oral Diagnosis and Treatment, by Samuel Charles Miller, D.D.S. The Blakiston Division, McGraw-Hill Book Co., New York, N.Y. Price $16.00.

Encyclopedic Guide to Nursing, by Helen F. Hansen, R.N., M.A. The Blakiston Division, McGraw-Hill Book Co., New York, N.Y. Price $6.00.

Neurochemistry, edited by Saul R. Korey, M.D. and John I. Nurnberger, M.D. Paul B. Hoeber, Inc., Medical Book Dept. of Harper & Brothers, New York, N.Y. Price $6.75.

The Surgical Management of Pulmonary Tuberculosis, edited by John D. Steele, M.D. Charles C Thomas, Publisher, Springfield, Ill. Price $9.50.

Textbook of Pathology, with Clinical Applications, by Stanley L. Robbins, M.D. W. B. Saunders Co., Philadelphia, Pa. Price $18.00.

Prevention of Disease in Everyday Practice, by Isadore Givner, M.D. and Maurice Bruger, M.Sc. M.D. The C. V. Mosby Co., St. Louis, Mo. Price $10.00.

Communicable Diseases, by Franklin H. Top, A.B.M.D. The C. V. Mosby Co., St. Louis, Mo. Price $13.50.

Epilepsy and the Law, by Roscoe L. Barrow, Dean, Univ. of Cincinnati College of Law, and Pearce Bailey, M.D. Paul B. Hoeber, Inc., Med. Book Dept., Harper & Bros., New York, N.Y. Price $5.50.

Studies in Respiratory Physiology, by H. Rahn, Univ. of Rochester School of Medicine and Dentistry, for Wright Air Development Center. 86 pages. OTS No. PP 121803, Dept. of Commerce. Price $2.25.